BULLETIN OF MISCELLANEOUS INFORMATION No. 5 1931
ROYAL BOTANIC GARDENS, KEW

XXXV.—GENERAL SMUTS' BOTANICAL EXPEDITION TO NORTHERN RHODESIA, 1930. J. HUTCHINSON.

When General the Rt. Hon. J. C. Smuts was in England in 1929 he referred to a possible botanical expedition that he hoped to be able to make through Northern Rhodesia as far as the African Lakes. He also expressed the desire that Mr. J. Hutchinson, who had collected with him when he visited South Africa on behalf of Kew in 1928, might be allowed to join the proposed expedition.

Since General Smuts is so keen a Botanist and possesses so wide a knowledge of the flora of South Africa, the opportunity of assisting in this collecting tour was gladly accepted and Mr. Hutchinson left Kew on June 6th and returned to duty on October 4th, 1930.

The party travelled by motor-cars from Pretoria via Messina, Zimbabwe, Victoria Falls and Broken Hill to the south end of Lake Tanganyika. Later Mr. Hutchinson visited independently the Katanga region of the Belgian Congo, the Matopos, and with various companion botanists the botanically little-known Zoutpansberg mountains in the Northern Transvaal, the Mont-aux-Sources in the National Park, Natal, and finally spent a week in the neighbourhood of Port Elizabeth, which he had previously visited during a period of drought.

With the active co-operation of General Smuts, Mrs. Arthur Gillett, Mr. J. B. Gillett, and other botanists, a large and interesting collection was secured, particulars of which are given at the end of the account. In the present paper only some of the more striking plants are mentioned and a few new species described (see pp. 245-254). The general working out of the collection* will have to be deferred until the final part of the Flora of West Tropical Africa has been completed and it is hoped that it may not be long before a full account of this interesting expedition can be published.

The expenses connected with Mr. Hutchinson's share in General Smuts' expedition were met from the funds placed at the disposal of Kew for collecting work of this character by the Empire Marketing Board. A. W. H.

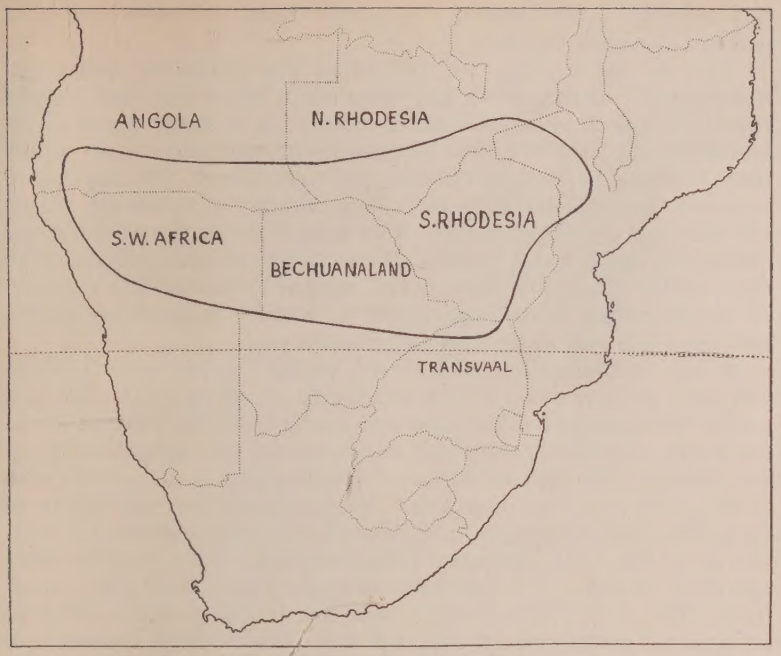
* The total number of specimens collected by Mr. Hutchinson on his two African tours has now reached 5,200. See also *K.B.* 1929, 273.

I arrived at Irene, Transvaal, on Thursday evening, June 26th. After a day of preparation spent in the purchasing of additional kit, etc., and paying a visit to the National Herbarium at Pretoria, our party started from Doornkloof, General Smuts' residence at Irene, early on Saturday morning, June 28th. At this season the early morning on the high-veld of the Transvaal is usually very cold and there had been several degrees of frost during the night. As I had previously visited the Pretoria district in midsummer, I was much struck by the contrast in midwinter, the veld looking very brown and dried up, and the vegetation by the roadsides being covered with dust. The roads, however, were in fairly good condition. Near Pienaar's River, the " Triumfetta veld " (*Triumfetta Sonderi* Fic. & Hiern), so conspicuous in summer, was now scarcely recognisable as such.

Our first camp was beyond Potgietersrust. At this season the vegetation thereabouts was quite uninteresting from the collector's point of view, and the bush-veld further north was even less attractive. Next morning an early start enabled us to reach Louis Trichardt in good time and proceed northwards via Wylie's Poort. By the roadside on the ascent we collected specimens of a fine *Cineraria* (*C. monticola* Hutch.) see p. 251, a new species which was in full flower. In the gorge towards the northern entrance the whole party lunched and then botanised along the neighbouring slopes, where we found a nice red-flowered *Kalanchoë*, which appears to be a new species, and other interesting plants. *Pterolobium exosum* Bak. f. (*P. lacerans* R.Br.), scrambling over the vegetation, with its bright winged fruits gave an autumnal effect and broke the monotony of the dull green shrubs and trees. Soon we passed our former camping ground at Fogwell's Paradise, at the northern entrance to the gorge, and almost immediately encountered fine specimens of the Baobab (*Adansonia digitata* Linn.).

About eight miles further on the dominant plant was the " Mopane " (*Copaifera Mopane* Kirk). A little to the east, however, we found later that the " Mopane " extends right to the base of the northern range of the Zoutpansberg. This " Mopane " bush continues without a break to the Limpopo and occupies much of Southern Rhodesia to beyond the Zambesi at this longitude.

About 10 miles south of Messina we camped out in the bush, and as we were now into " lion country " we made a circle of the cars and spread our mattresses as near them as possible and hoped for the best. The country thereabouts was at this season in a dry and parched condition and little botanising was possible. From Messina we crossed the Limpopo by the magnificent new bridge, whereon were waiting to join us Dr. I. B. Pole-Evans, C.M.G., Chief of the Division of Plant Industry of the Union of South Africa, and two assistants, with a new lorry-caravan specially fitted for botanical exploration. Dr. Pole-Evans accompanied us to Lake Tanganyika and back, the two parties collaborating and frequently rendering



Range of "Mopane," *Copaifera Mopane* Kirk. (Since this map was printed Dr. Burtt-Davy informs me that the species occurs at Liwonde and near Chiromo in S. Nyasaland. J.H.)

mutual assistance. At this season the flat "Mopane" bush country as far as the Lundi River was not particularly interesting, but here and there bushes of *Iboza riparia* N. E. Br. (*Moschosma riparium* Hochst.) served to brighten the wayside. We arrived at the Lundi River in the late afternoon and after a refreshing bathe in its cool waters were soon botanising along its picturesque banks, soothing to our eyes tired with the dusty roads and sombre "Mopane" bush. If we had known that a huge python had been seen amongst the boulders within a few yards of our beds, our sleep that night might not have been quite so profound. Early next morning we explored the granite kopjes nearby, finding a large quantity of quite big trees of *Androstachys Johnsonii* Prain growing in company with *Croton subgratissimus* Prain. The *Androstachys* is called "Mzumbite," and numerous seedlings were observed, regeneration evidently being very good. Some of the trees had trunks quite 18 ins. in diameter. Here, on the granite, there were numerous specimens of the interesting resurrection plant, *Myrothamnus flabellifolia* Welw., which extends from the Magaliesberg to Angola and far up into Northern Rhodesia. In the afternoon we set off to the north-east in the direction of Victoria, passing through beautiful but apparently almost uninhabited country between large granite kopjes. At the edge of

the range we again entered " Mopane " bush, characterising poor and uninteresting country.

Late in the evening we arrived at the Zimbabwe ruins and camped out. During the night there was a heavy dew and a slight frost. It was a weird and novel experience to wake up at dawn almost in the shadow of the famous Zimbabwe ruins about which there has been so much speculation and controversy. We thoroughly explored the ruins and collected a large number of specimens during the two days we stayed there. A striking plant by the roadside and around our camp was a Labiate, *Pycnostachys urticifolia* Hook., with dense spikes of sky-blue flowers and nettle-like leaves. This species is widely spread from Tanganyika to Natal. A short botanising excursion was also made a few miles to the east.

Early on the morning of July 3rd, we left Zimbabwe by a rather bad road to Umvuma and reached Gwelo about midday. We had passed through much *Combretum* and *Acacia* bush, but beyond Gwelo for about 50 miles or so to where we camped for the night the country was mostly of the high-veld type, undulating long-grass country with a few trees at long intervals. We collected fine specimens of *Loranthus* and *Asparagus*, and *Clematopsis* was common in fruit. Our camp was by the Shangani River amongst a dense stand of spiny species of *Acacia*. We found the night very cold, with 4 degrees of frost. Mr. J. B. Gillett and I were up at daybreak in order to transfer our partly dried plants to thin papers ready for making into parcels and despatching from Bulawayo to Pretoria, where the drying was to be completed.* Our presses were filled already and they were in this state during most of our journey. It was no light task to contrive to have enough paper dried each evening for the next day's collection. For this purpose we usually lighted a separate fire, the " botanical fire," to be out of the way of cooking. This botanical fire eventually grew quite popular, for the presses provided suitable seats for most of the party, some of whom regaled us each evening with various stories, including usually a lion story. This particular morning we did not finish the presses until after 10.30, when we followed the trail of the remainder of the party to Bulawayo as fast as possible. This part of the route was through rather poor and somewhat uninteresting country, the road running parallel with the railway through grass-veld most of the way.

We left Bulawayo soon after midday, much precious time being saved by a friendly store-keeper kindly offering to pack our nine parcels of specimens and despatch them by rail to Pretoria. The road from Bulawayo was quite good as far as Lonely Mine, the veld being mostly covered with *Combretum* and *Acacia*, very like the bush-veld of the Northern Transvaal. After leaving Lonely Mine we passed through " Mopane " forest glowing with autumnal tints, accentuated by the setting sun facing us to the north-west. About

*We were greatly indebted to Dr. E. P. Phillips and the assistants at the National Herbarium in Pretoria for the care taken with our collections, which we sent to them, dried or partially dried, at intervals *en route*.

Copaifera Mopane Kirk, the dominant plant in the extreme northern Transvaal and Southern Rhodesia. A, longitudinal section of flower. B, stamens. C, longitudinal section of ovary. D, fruit. E, seed showing lines and dots of resin.

30 miles beyond Lonely Mine we at last found a suitable camp in a picturesque spot at the edge of " Mopane " forest, with a wide vista of tall brown grass in front of us—a typical African setting. Our fires were lighted in the midst of a grove of beautiful little trees, which proved to be *Monotes glaber* Sprague, a member of an interesting Dipterocarpaceous genus. This and the allied *Marquesia* are the only representatives of this family in Africa, the remainder being natives of Indo-Malaya. General Smuts was particularly pleased to see examples of this interesting genus.* Across the valley during most of the night we could hear the tom-toms from a village, the natives evidently celebrating in great style. Although far from wakeful I found myself not unwilling to hear the roar of some wild beast to complete the setting.

July 5th, a Saturday, proved to be a motoring day, the road being very bad and passing through sandy vleis and rough " Mopane" forest. Near Dett, however, I stopped the car to collect a beautiful blue-flowered Acanthaceous plant, of which there was only a small patch in an otherwise long flowerless stretch of country. Our destination that night was to be the Wankie Coal Mine, but fortunately we stopped short of that somewhat dreary place, and camped out near a dried-up river bed. As we were short of water we enquired of a wild looking native, who took us to the bed of the river, and I learned how to obtain a plentiful supply of palatable water where apparently none existed by scooping out a deep hole in the sand into which water by seepage at length slowly trickles. Dr. Pole-Evans, who had failed to appear in camp the previous night, now turned up, having covered, in order to overtake us, 190 miles in the day, including a very bad stretch over the Mica Hill during the last stage. That piece of road was the worst I experienced in Africa, and I have motored over some really bad ones.

In the afternoon of the next day (July 6th) we arrived at the Victoria Falls. The visitor to Africa from overseas, accustomed as he may be to the beauties of the Alps, the Pyrenees, or the charm of the English lakes, is apt to find some of the scenery falling short of the descriptions given by African writers. Not so, however, with the Victoria Falls ; they were all and even more than I had ever pictured them, and not in the least overrated in any account which I have read.

The Administration of Northern Rhodesia had kindly arranged for us to camp on a beautiful site about a mile above the Falls on the northern bank of the river. This was a delightful place and we stayed there for four nights. Mr. Pardy, District Forest Officer, who accompanied us on our botanical trips in the neighbourhood, was of great assistance as guide, and the Curator of the Falls gave us every help. One morning was devoted to making a collection in the so-called " rain-forest " at the Falls. A luxuriant vegetation, quite different from the flora of the surrounding country, grows under

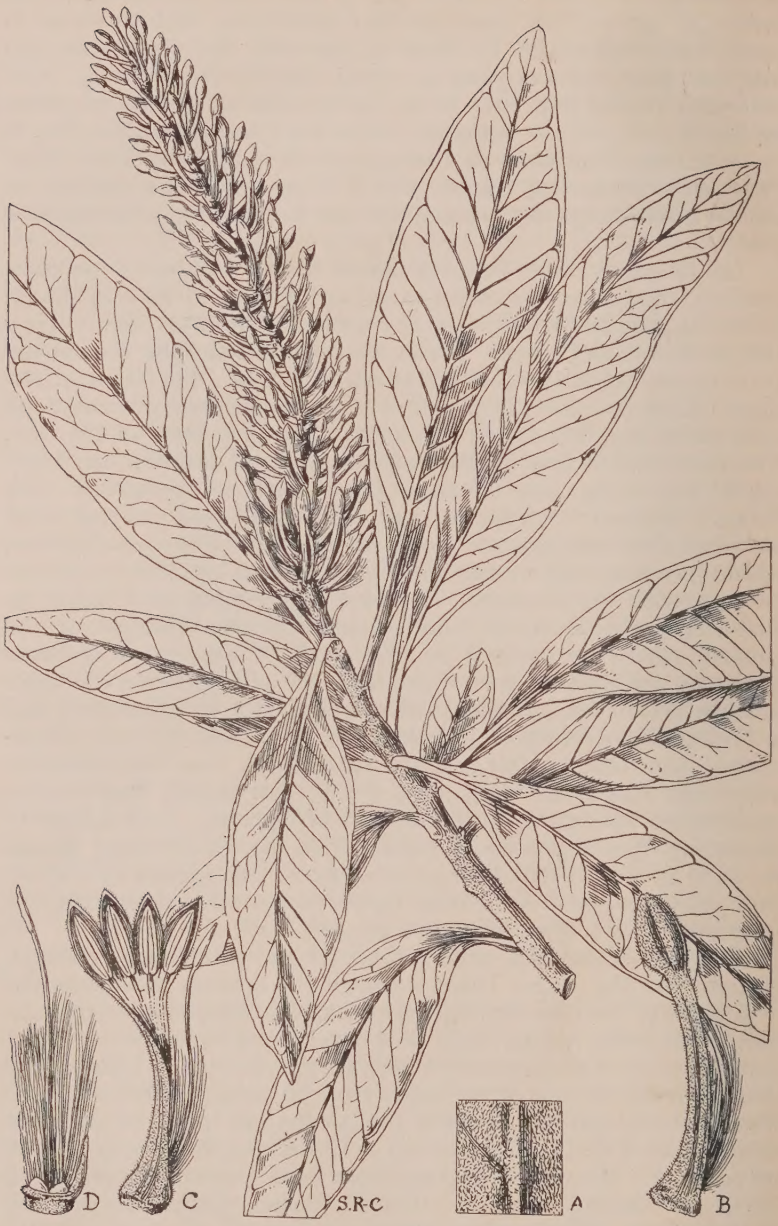
*On p. 251 I give a key and enumeration of the Rhodesian species of *Monotes*.

the spray of the great cataract. We collected everything in flower, and in another paper I hope to give a list of the species which are known to grow under these peculiar conditions, with notes as to their distribution. At the time of our visit the river was high and the spray was ascending to a very considerable altitude. Our collecting books show that we gathered about 40 species of plants in flower or fruit. A complete collection from the rain-forest, if made at monthly intervals throughout the year, would no doubt yield very interesting results, and I hope that some resident or official interested in botany may be able to carry out this desirable project.

On Thursday, 10th July, we parted from a number of our companions who had accompanied us so far, amongst whom was Mrs. J. C. Smuts, who had looked after our personal comfort so well. They left to return to Pretoria, whilst we departed for the botanically little-known regions of North-Eastern Rhodesia. For the next few days I have few notes in my diary. My whole time was taken up with collecting and drying specimens after long days in the cars. The roads were tolerably good and most of the journey was fairly rapid, stops being made at various points to collect specimens. The country beyond Livingstone was open sand-veld covered with scattered *Brachystegia* and *Combretum*, grass and *Copaifera Mopane*. About 30 miles away we met with *Protea*, and at 43 miles we seemed to part with the Baobab. The first day yielded only about 30 numbers, gathered at ten different spots between Livingstone and Choma, where we camped for the night. Conspicuous in burnt places by the roadside were a dwarf species of *Combretum* (*C. platypetalum* Welw.), with bright scarlet flowers close to the ground, and a *Triumfetta*, probably *T. Mastersii* Bak. f. The country thereabouts, and indeed as far as Lake Tanganyika, was a succession of wide open long-grass vleis, quite dry at this season, and *Brachystegia* forest, with groves here and there of *Uapaca*. Both appear to possess wonderful powers of regeneration, the *Brachystegia* mainly by stool shoots, the *Uapaca* by seedlings. One species of *Uapaca* (not yet determined) with large leaves bore a striking resemblance in growth-form to *Rhododendron Falconeri* Hook. f.

Between Mazabuka, where there is an agricultural research station, and the Kafue River, through the country known as the "Ridgeway," we observed numerous scattered examples of a remarkable *Phyllanthus* 4–6 ft. high, with fascicles of branchlets; also a great quantity of *Clematopsis Stanleyi* Hutch., in fruit. Approaching the Kafue River were steep ridges covered with *Brachystegia*, etc., with beautiful autumnal effects due to the red leaves of *Hymenocardia acida* Tul. (Euphorbiaceae). The Kafue River was crossed by pontoon. We explored its northern bank for some distance, and found the thorny scrub of *Albizzia*, various Capparidaceae and *Balanites* very difficult to penetrate.

We arrived at Broken Hill on the morning of July 13th, where the cars were greased and overhauled. Whilst that was being done a



Faurea argentea Hutch. A, lower surface of leaf. B, opening flower-bud. C, open flower. D, pistil and hypogynous scales.

friendly storekeeper allowed us to use his premises to pack up our dried and partly dried material for despatch to Pretoria. As it was a public holiday that day the railway officials refused to accept our box for transmission by rail and we were compelled to leave it at the store, the manager kindly promising to send it away the next day.

From Broken Hill for the first ten miles there was much *Brachystegia* and *Uapaca*, and for quite another 90 miles an endless forest dominated by these two genera, with a carpet of grass and other herbs. We camped that night, after a rather long and uncertain search in the semi-darkness for a suitable spot, amongst the trees by the road some 8–10 miles beyond Chiwefwe. At the latter place General Smuts, who was behind the rest of the party, had called at the farm of Mr. Stephenson, and arrived late in camp with a generous supply of large and beautiful oranges presented by the proprietor. At the close of my expedition Mr. Stephenson kindly sent a box of these luscious fruits to the steamer at Cape Town and they travelled the vast distance by rail and sea to England in excellent condition. The expense of the long rail journey in South Africa, however, mitigates against their importation into this country in any quantity.

The next day, from Chiwefwe to Serenje Corner, proved somewhat eventful to Jan Gillett and myself. After breakfast we all botanised on the neighbouring hills, and returned about 10.30. The remainder of the party left for our next camp which was to be about 110 miles further on, whilst we two remained behind to label and put in the press the numerous specimens we had gathered. This was not completed until nearly midday. We had gone only a few miles, however, when the back wheel of the car struck the stump of a *Brachystegia* in the road and completely jammed. The car would go backwards but not forwards, and to travel a hundred miles or so in reverse gear was not to be thought of in such a country. We tried our best to release the wheel, but had not the necessary tools to remove all the fittings. As it was now late afternoon there seemed nothing to be done but prepare to spend the night where we were, although we fully expected the General to return for us sometime about midnight. A rather shy native had watched us for some time and when he realised that we had decided to sleep there he obligingly dragged a large quantity of dead timber and lighted a fire. Soon, however, and to our great relief, we heard in the distance the hum of an engine from the direction of Chiwefwe (a sweet, musical sound under the circumstances !) and at length the Government Post lorry with a crowd of passengers on top drew up beside us. The driver had the necessary tools and in a very short time the jammed rear-brake was removed and we were following his trail northwards in the darkness. About ten miles from the camp which had been established near Serenje Corner, we met the General on his way back to see what was the matter. Next morning Mr. Chicken, the District Commissioner, arrived early in camp and was very helpful with information as to our further journey. The previous day, whilst we were delayed, General Smuts and Mrs. Gillett had collected

towards Serenje Corner a new species of *Monotes* which is described on p. 246 as *Monotes cordatus* Hutch. In fact, between Broken Hill and Lake Tanganyika our party collected no fewer than five new species of *Monotes* (see pp. 246-248), and no doubt there are still more in these *Brachystegia* forests. In places the bright red enlarged sepals subtending the fruits gave quite a gay colour to the landscape. An account of the genus in Rhodesia is given on p. 251.

Between Serenje Corner and Mpika, our next halting place, some interesting plants were collected. Before leaving camp we gathered a beautiful silver-leaved *Faurea* which proves to be new, *F. argentea* Hutch. (p. 249). At 22 miles along the road we pulled up quickly at the sight of a beautiful and very striking Labiate growing by the road-side amongst the bracken which formed a carpet below the *Brachystegia*. This proved to be an interesting species of *Coleus*, *C. elegantissimus* Taylor, a new name for *Plectranthus Baumii* Gürke, there already being a *Coleus Baumii* Gürke. On the banks of the Lukulu River we found fairly large trees of *Myrica conifera* Burm. f., a common Cape species, and beneath them fine examples of the Royal Fern, *Osmunda regalis* Linn., a beautiful scarlet-flowered *Erythrina*, another new *Monotes* (*M. lukuluensis* Hutch., see p. 247), and various other plants. On the rocky kopjes at Kaloswe we again met with the *Myrothamnus* associated with species of several purely tropical genera such as *Landolphia*, *Strophanthus*, *Hymenodictyon*, *Harungana* (*Haronga*) and *Artabotrys* (*A. collinus* Hutch., n. sp., see p. 245).

Much of the forest around Mpika has been cleared, and the grounds around the station resemble an English park. We were welcomed by Mr. Hill, the District Commissioner, who made every possible arrangement for our comfort. Huge fires were built by his " boys " around our camp and for that night at any rate we had no fear of lions.* Growing amongst the grass was a beautiful species of *Pleiotaxis* (not yet determined), with scarlet flower-heads. I obtained seeds of this and sent them to Kew, but so far they have not germinated.

In a swamp near a river about six miles north-east of Kasama, however, we encountered the most handsome herbaceous plant seen on the whole journey. This proved to be *Coleus leucophyllus* Baker, which is synonymous with *C. mirabilis* Briq., the latter name having priority by about a year. It is a very handsome plant about 6 ft. high, with silvery-white foliage and multiflorous oblong panicles of sky-blue flowers, the panicles 1–1½ ft. long. In gathering specimens I sank nearly to the knees in the mud, so that its cultivation in a greenhouse in this country might prove very difficult. Unfortunately there were no seeds to be found at that time. On our return journey, when we had more time allowed us here by our leader, we collected a host of interesting plants in this same locality,

*Shortly after our visit, however, a man-eating lion gave some trouble here.

including two new species of *Nymphaea*, one, *N. primulina*, with beautiful primrose-yellow flowers, and a second with pale blue flowers, but with all the leaves submerged and bilobed (see fig. below and p. 246). So far as we know this is the first species to be found in Tropical Africa with all the leaves submerged; the same characteristic has been recorded for *N. oxypetala* Planch. from Ecuador, *N. amazonum* forma *submersa* Sagot, and occasionally for *N. alba* Presl. I have named our new species *N. divaricata* in reference to the divaricately lobed leaves. The plants were growing in deep and fairly slow-moving water and the leaves formed a dense carpet about $2\frac{1}{2}$ ft. below the surface of the water.

Nymphaea divaricata Hutch. A and B, outer and inner sepals. C, petal. D, stamen. E, longitudinal section of pistil.

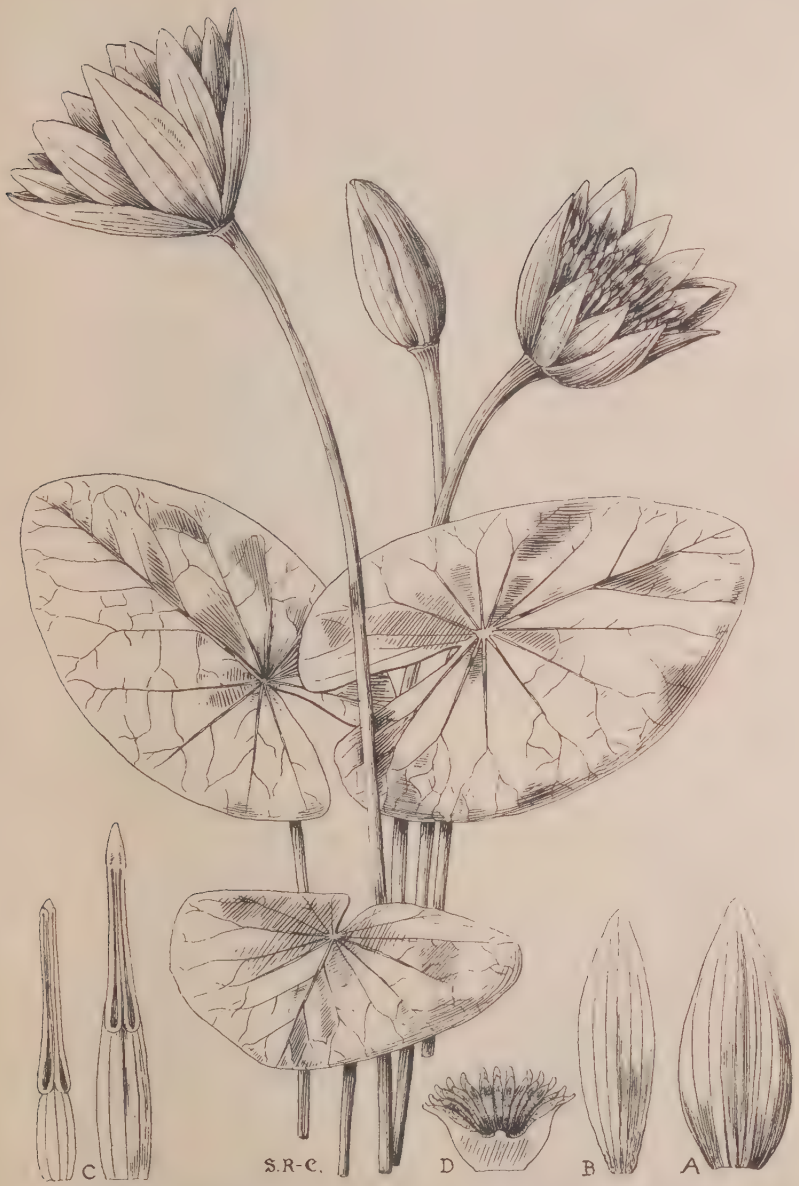
We camped on the evening of July 17th some miles north of Kasama beneath a light mosaic-like blanket of *Brachystegia*, under which one lay, with the wonderful southern sky and its myriads of stars as a roof. We were now within an easy day's drive of Abercorn near the south end of Lake Tanganyika. We started the next morning at eight o'clock along a good level road of brown sand, the light *Brachystegia* forest thereabouts much resembling a Devonshire wood in autumn, some of the young shoots giving the necessary colouring to the landscape. At 30 miles north from Kasama we collected for the first time *Dodonaea viscosa* Jacq. in full fruit, and also species of *Bridelia* and *Canthium*. The somewhat sombre green of much of this forest was brightened by an occasional tree of *Monotes*, with beautiful crimson enlarged sepals which contrasted well with the bright yellow-winged fruits and foliage of the *Dodonaea*. About 30 miles south of Abercorn we found the road carpeted with *Pentanisia*, some Acanthaceae, *Scutellaria* and *Indigofera*. Another

three miles northwards we found a vast quantity of *Vernonia oöcephala* Baker, a plant I knew to have been for a long time represented in the Kew herbarium by only one specimen. From the manner in which Abercorn is recorded on the map with which I had been familiar for many years, I had imagined it to be something of a town, and we were much surprised, therefore, to find it consisted of but a few houses, with only twelve Europeans. The District Commissioner had selected a site for our camp near the lake about a mile from Abercorn, and we collected a number of specimens in the neighbourhood.

Next day, July 19th, we proceeded towards Lake Tanganyika. By a small stream at 7 miles we were checked in our progress by the sight of a beautiful tree 20 ft. high full of white flowers. This proved to be a flowering specimen of a tree collected a little later in fruit in the Lunzua Valley about half way between this point and Lake Tanganyika. I have named this beautiful new species, of which we have seven to eight sets of specimens, after Mrs. Arthur Gillett, who took a keen interest in our work and assisted us throughout. It is a species of *Ochthocosmus* (Erythroxylaceae), *O. Gillettae* Hutch., n. sp. (see p. 249).

Our camp on Saturday, July 19th, was amongst rather high *Brachystegia* forest and during the night there was a gale of wind. Before nightfall we ascended the very fertile valley by a stream and got badly pricked by the hairs of *Mucuna* and scared out of the water whilst bathing by a vicious-looking water-snake. Forming almost a carpet below the *Brachystegia* were numerous examples of a very dwarf sub-herbaceous species of *Tetracera* (Dilleniaceae), another example of a woody type reduced to the herbaceous habit.

Next morning we started early on our last stage to Lake Tanganyika, a gradual descent through picturesque scenery. We soon had a magnificent view of this splendid inland sea with a few islands dotted here and there at the southern end. By the roadside the more tropical conditions of the lower elevation were apparent by the occurrence of very slender and lofty palms swaying in the wind. On the shore of the lake we were met by Mr. Maxwell, of the African Lakes Corporation, who took the whole party in his motor-boat to botanise on the other side of the lake. There we also visited a large and most interesting native village, " Tom's village," where the whole of the inhabitants turned out to see us. Beyond the village are some picturesque falls. Returning in the late afternoon the " sea " became quite rough, the boat shipping some water before we reached the landing place. The kopje nearby yielded some interesting botanical specimens. Most of the bush-forest for some miles from the lake consisted of a few scattered *Brachystegia*, a great quantity of *Diplorrhynchus mossambicensis*, some *Dalbergia*, *Rhus*, *Terminalia*, a bush *Vernonia*, *Grewia* spp., *Bauhinia*, etc., and a beautiful red-fruited *Monotes*. Here and there were plants of a very large-fruited species of *Uapaca*. An elegant small-flowered



Nymphaea primulina Hutch. A, sepal. B, petal. C, stamens. D, longitudinal section of pistil.

Cryptosepalum fruticosum Hutch. A, flower laid open. B, longitudinal section of flower. C, bracteole from inside. D, pistil. E, anthers.

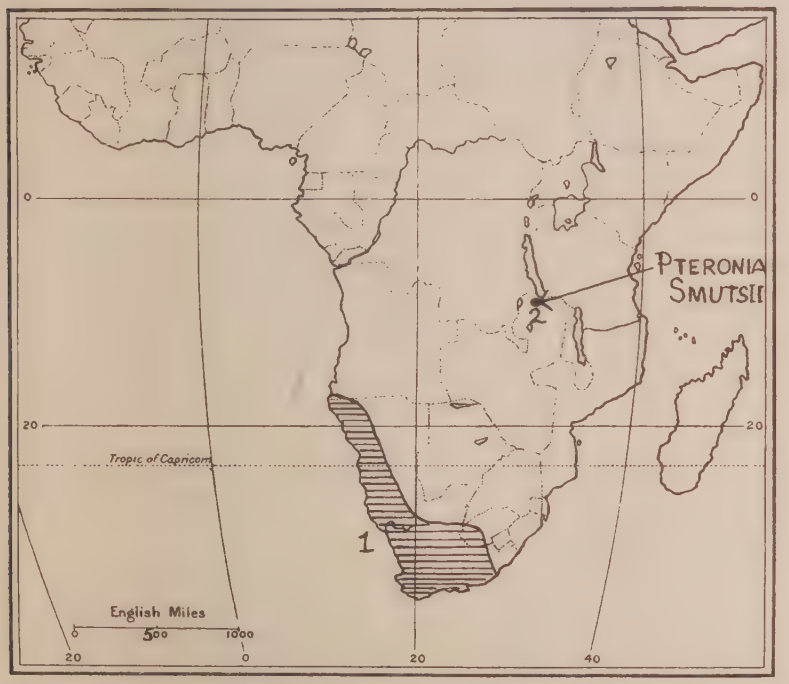
" Brachystegia " with precocious pink flowers giving colour here and there, proved to belong to the closely allied genus *Cryptosepalum*, of which it is a new species, *C. fruticosum* Hutch. (see pp. 238, 250). Perhaps there is no better example of the progressive reduction in habit from trees to herbs with woody rootstocks than in the two genera *Brachystegia* and *Cryptosepalum*. Brachystegias, except one Angolan species, *B. Russelliae* Johnston, are trees varying in height from 10 ft. to about 60 ft. Many of them reproduce readily from sucker-shoots. Species of *Cryptosepalum*, however, are mostly very dwarf, the shoots appearing annually from a woody underground stock. Accompanying this reduction in habit is a corresponding reduction in floral structure, *Brachystegia* having 5 to sometimes no petals and 15 to 10 stamens, whilst *Cryptosepalum* has only 1 petal and 5, 4 or usually only 3 stamens.

Before leaving our last camp some miles south of Lake Tanganyika, we explored the country on the south side of the Luanza River, a swift-running stream. After collecting through very difficult country for some hours I crossed the stream and returned with our spoil to get it into the presses as soon as possible. In so doing I unfortunately missed seeing the collection of the most interesting plant during the whole trip. General Smuts and the others had proceeded to explore the mountains to the south and on the top of the escarpment they discovered a plant which I recognised as a *Pteronia*, a genus I knew to be confined to South Africa. This proved to be a fine new species which I have named *Pteronia Smutsii* (see pp. 240, 250) in honour of our leader. Whilst undoubtedly a *Pteronia*, it has no very close relationship with any of the known South African species. The discovery of this genus on these mountains is thus of considerable phytogeographical interest, being one more example of a South African genus, such as *Protea*, which has migrated northwards along the eastern mountains. As will be seen on the sketch map (p. 241) *Pteronia Smutsii* is separated from its congeners by over a thousand miles.

On reaching Abercorn we packed up several parcels of dried plants and despatched them by post to Pretoria, our cars being already fully loaded. Between Abercorn and Broken Hill there is little to record except minor motor mishaps, none of which was serious enough to delay us more than a few hours. We had now set our faces homewards and collecting was only done at likely spots which we had noted and missed on our journey northwards. We arrived at Broken Hill on Saturday morning, July 26th, when I left the motoring party, which was to return to Pretoria, I myself spending two days at Broken Hill to clear the presses and despatch the dried plants by post. On Monday evening, July 28th, I left Broken Hill by a goods train for Elizabethville, arriving at the frontier station Sakania early the next morning. Sakania is not an attractive place to stay at for even one day, especially as the forest round about was similar in every way to what I had already seen. I took a couple of native boys with me and penetrated into the forest a few

Pteronia Smutsii Hutch. A, leaf. B, lower surface of leaf. C, flower. D, stamen. E, pappus and separate bristle. F, style-arms.

miles but found little to collect. The ant-heaps in the neighbourhood were covered, not with *Euphorbia* and other spiny plants as they had been towards the lake, but by a dense growth of a fine Bamboo, *Oxytenanthera abyssinica* Munro. Sakania is the railhead for the Rhodesian railways, but through-coaches proceed to Elizabethville. I was not sorry to leave next morning; the train, however, was three hours late, and arrived at Elizabethville at nine in the evening. The *Brachystegia* forest continued to be much the same all the way and rarely was there any view of the landscape from the train.



Shaded area 1, showing distribution of genus *Pteronia* before the discovery of 2, *Pteronia Smutsii* Hutch., on a mountain top south of Lake Tanganyika.

I collected in the neighbourhood of Elizabethville with Mr. von Hirschberg, then acting British Vice-Consul, who is keenly interested in orchids. We explored together the banks of a small river bearing quite a different kind of forest vegetation from the *Brachystegia* type, with genera represented which are characteristic of the closed forests of the Congo. Indeed the closed forest of the River Congo stretches its arms in all directions by means of these innumerable small tributaries and enables it to penetrate far into the quite different dry forest of the plateau region. A large burnt area some miles from Elizabethville was a beautiful sight on account of a great quantity of a pale mauve or pink-flowered species of

Cryptosepalum (*C. maraviense* Oliv.) with dwarf shoots a few inches high. This species extends to beyond Lake Nyasa. Associated with it was a tiny *Euphorbia* (*E. zambesiana* Benth.) with conspicuous white involucral glands.

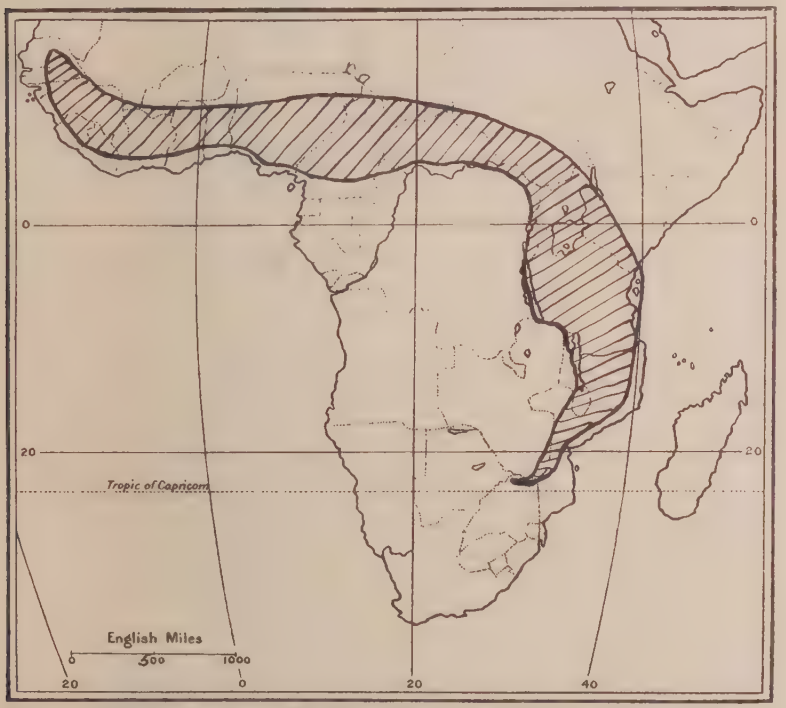
I left Elizabethville, which in the winter months is rather a dusty town, at nine o'clock in the evening on Sunday, 3rd August, arriving at Bulawayo on the Tuesday morning. The next day was occupied by a visit to the Matopos, Miss Cheeseman, an artist interested in botany and a correspondent of Kew, kindly acting as guide. On the granite boulders around Cecil Rhodes' grave we secured a quantity of living specimens of the very rare *Anacampseros rhodesiaca* N. E. Br., which we had recorded for the first time for the Transvaal at Matoks, on my former visit. The Matopos yielded a number of interesting plants in spite of the unfavourable time of year.

From Bulawayo I returned by rail to Pretoria, in order to arrange for the despatch of the collections to Kew. I was very much gratified to find that all our parcels had arrived safely and that every care had been taken of the specimens. Dr. Pole-Evans' assistants had not only finished off the drying but had poisoned every specimen thoroughly, and I had no further anxiety as to their condition.

On my former visit I had explored with General Smuts and a party of friends Wylie's Poort and Gorge, and part of the Eastern Zoutpansberg range of mountains in the Northern Transvaal. This range has had a peculiar fascination for me personally ever since I shared in the preparation of Mr. Legat's notes on his tour in these mountains published in the *Kew Bulletin* as long ago as 1910 (p. 49). Since then scarcely any collecting has been done in this region apart from our own visit at the end of 1928. With General Smuts' approval, therefore, Mr. Jan Gillett and I set off on the 16th of August for a week's botanising in these delightful mountains. The Forestry Department at Pretoria very kindly informed their officers of our intended visit and we received much help and kind hospitality from them. The first night we slept out beyond Potgietersrust in full view of miles of bush fires on the opposite side of the valley. A little south of Louis Trichardt we turned eastwards, collected many interesting plants in the grass-veld on the way, and arrived at the house of Mr. Evans at Klein Australe in the late afternoon. We botanised in his company in the evening and the next day, and then proceeded by a picturesque and beautifully graded road over the mountains to Entabeni, where we stayed for two days with a former Kewite, Mr. R. R. Mentzel, who has been for many years in the Forestry Service of South Africa. His house stands amidst most picturesque scenery, and the winter climate as experienced by us was delightful. Mr. Mentzel acted as our guide in exploring the hills and forests near the forestry station. The Zoutpansberg consists of two or more parallel ranges of hills or low mountains, the southern range being very fertile, with a heavy rainfall, and bearing a forest flora similar in many respects to that of the eastern slopes of the

Drakensberg and even of the Zitzikama and Knysna forest in the extreme south of the Union. When our collections are completely worked out no doubt considerable light will be thrown on the flora of the Zoutpansberg and its phytogeographical connections. That will be done in a separate paper.

From Entabeni we proceeded further eastwards towards Palmary Ville, noting on the way numerous scattered examples of *Parinarium curatellaefolium**, a tree with a close head 30–40 ft. high and a stem 1–2 ft. in diameter. This tree is quite characteristic of this part of the country. By the roadside here and there were fine examples in full flower of *Dombeya rotundifolia* Harv., resembling plum trees in Europe, the flowers being precocious. We camped out on the grassy banks of the river near the Pepiti Falls, and had the assistance of several small boys from the neighbouring village. They were keenly interested in our collecting operations.



Range of *Parinarium curatellaefolium* Planch., a distinctive Savannah tree.

After returning to Louis Trichardt we proceeded up the pass and at the top turned left in a westerly direction. So far as we know no botanical collection has been made in the Western Zoutpansberg,

*This had been formerly identified as *P. Mobola* Oliv. I have made a careful comparison with the type specimens of this from the Batoka Highlands and our plant appears to be *P. curatellaefolium* Planch., common through East Africa as far as the Eastern Sudan and through the Shari to West Africa.

and we made a fine haul of specimens, penetrating as far as the road continued to Crewe Farm (Mr. Oosthuysen). Here again we were very surprised to find several representatives of the typical Cape flora mixed up with Northern Transvaal types such as *Chrysophyllum magalismontanum* Sond. and *Myrothamnus flabellifolia* Welw. Amongst these plants were species of *Erica*, and *Metalasia muricata* R. Br., quite true to type as it occurs on the sand dunes of the Cape Flats. So far as the Kew Herbarium is concerned this latter species had not been collected further north than Basutoland. A fine dwarf *Lopholaena* and a pretty *Aster*, almost a counterpart of *A. fruticosus* Linn., a common Cape species, were conspicuous. I have named this *A. brevipedunculatus* in reference to the very short stalks of the flower-heads which serve to distinguish it from the Cape plant (see p. 250). Even the Namaqualand type of flora was not unrepresented, for we collected fine specimens of a *Senecio* (section *Kleinia*) which proved to be *S. babertonicus* Klatt.

On our return to Wylie's Poort we again went north to the far end of the gorge, where we turned eastwards in the direction of Lake Fundusi, which we had visited in December, 1928. This side of the range was very dry and we found little to collect. We were very interested to observe, however, that *Copaifera Mopane* reached right to the foot of the mountains, and that very numerous examples of the Baobab, indeed almost a forest, grew quite high up the northern slopes. We saw, also, large forests of *Androstachys* with *Acacia* and *Peltophorum africanum*, the northern face of the mountains apparently being the path of migration of the tropical types from the eastern side.

The road eventually became rather difficult and sometimes troublesome to follow, but at length when it was nearly dark we obtained our bearings and recognised the country we had previously visited. From there we returned in one day to Pretoria, collecting on the way all the plants we could find on a granite kopje at Matoks.

Before returning from Cape Town I collected in the National Park with two members of the Botanical Survey, Miss Verdoorn, from Pretoria, and Miss Forbes, from the Natal Herbarium, Durban. We made the Government hostel our headquarters and from there made excursions up the mountains. We ascended the Mont-aux-Sources (10,763 ft.), staying one night at the hut. Unfortunately a few days before our visit a disastrous fire had occurred and most of the lower mountains were completely burnt over. Although it was the middle of winter we collected about 170 species in flower. I saw for the first time *Greyia Sutherlandii* Hook. & Harv. in full flower, its scarlet trusses giving colour here and there.

At Durban, Mr. McClean and Miss Forbes kindly acted as my guides and I saw and collected some interesting herbaceous plants at Botha's Hill, and visited the mangrove swamps south of Durban. Finally, a week at Port Elizabeth with Mr. F. R. Long proved to be very profitable, large collections being made on the way to and near

Hankey, and towards Addo. The veld near Port Elizabeth, with the typical south-western Cape flora, was at its best, a remarkable contrast to what I had seen on my former visit to this area during a drought period in November, 1928.

Two interesting days were spent at the Cape, one on my arrival in June, a day on the mountains near Kalk Bay with Mrs. Levyns and students from the University, and another on my return with Professor and Mrs. Compton on Paarden Island, north of Cape Town, where the flora was seen at its best.

With the assistance of many botanical friends, only some of whom it has been possible to mention in these notes, I was able to collect four to five sets of herbarium specimens represented by nearly 2000 numbers. Of these about 900 were gathered in Rhodesia, 40 in the Katanga Region of the Belgian Congo, 315 in the Zoutpansberg, N. Transvaal, 18 at Matoks, N. Transvaal, 168 in the National Park, Natal, 82 at Botha's Hill, Natal, a few in the Mangrove area south of Durban, about 380 in the neighbourhood of Port Elizabeth, 43 on Paarden Island and 30 at Kalk Bay.

Artabotrys collinus *Hutch.* sp. nov. [Annonaceae]; affinis *A. nitido* Engl., sed foliis minoribus costa utrinque pubescente, carpellis fructiferis rostratis differt.

Frutex subscandens usque ad 1·65 m. altus; rami teretes, breviter rufo-pubescentes. *Folia* elliptica vel oblongo-elliptica, basi obtusissima vel rotundata, apice obtusa vel late acuminata, 3–5·5 cm. longa, 2–2·5 cm. lata, utrinque costa media breviter pubescentia; petioli 3 mm. longi, tomentosi. *Inflorescentia* brevissime hamata, subuniflora, rufo-tomentosa. *Flores* non visi. *Carpella* fructifera oblongo-ellipsoidea, conspicue rostrata, 1·5–1·8 cm. longa, glabra, rugulosa.

Northern Rhodesia: granite kopje near Kaloswe, straggling shrub 5 ft. high, fr. July, *Hutchinson and Gillett* 3770.

Nymphaea primulina *Hutch.* sp. nov. [Nymphaeaceae]; affinis *N. sulphureae* Gilg, sed floribus majoribus, sepalis latioribus, antherarum exteriorum connectivo multo breviore differt.

Folia longissime petiolata, ambitu late ovato-orbicularia, basi profunde et arcte cordata, circiter 8 cm. longa et 6–7 cm. lata, integra, sicco infra pustulato-scabridula et purpurascentia, e basi radiatim 15-nervosa, nervis superne divaricato-ramosis; petioli graciles, apicem versus parce puberuli. *Flores* supra aquam breviter elevati, primulini; pedunculi elongati, minute puberuli. *Sepala* 4, late oblongo-lanceolata, apice rotundata, basi extra transverse calloso-incrassata, 3·5–4 cm. longa, vix 1·5 cm. lata, obscure striata, glabra. *Petala* circiter 10, biseriata, sepalis subaequilonga, late oblanceolata, obtusa, 5-nervosa, usque ad 1·2 cm. lata, interioribus angustioribus. *Stamina* 5-seriata, flava, exterioribus petalorum $\frac{3}{4}$ longitudine aequantibus; filamenta late complanata; antherae usque ad 1 cm. longae, exteriores connectivo

lato obtuso circiter 3 mm. longo, interiores connectivo brevissimo. *Carpella* circiter 12, stigmatibus breviter pubescentibus 8 mm. longis.

Northern Rhodesia : in pool of nearly still water, stream 6 miles north of Kasama, 1350 m., 23 July 1930, *Hutchinson and Gillett* 4048 (see p. 237).

Nymphaea divaricata *Hutch.* sp. nov. ; inter species africanas foliis omnibus submersis divaricato-bilobatis distincta.

Folia omnia sub aqua submersa, breviter petiolata, basi leviter peltata, divaricato-bilobata, tenuissima, lobis oblique ellipticis usque ad 12 cm. longis integris, nervis e basi patulis multum ramosis ; petioli breves, glabri. *Flores* fluitantes vel leviter immersi, pallide caerulei ; pedunculi glabri. *Sepala* 8, biseriata, exteriora ovato-lanceolata, late acuminata, interiora angustiora marginibus hyalinis roseis, omnia extra sulcato-striata, 4–4·5 cm. longa, usque ad 1·5 cm. lata. *Petala* circiter 15, lanceolata, sepalis subaequilonga, acuta. *Stamina* 2- vel sub-3-seriata, flava, exteriora petalis dimidio breviora ; filamenta late complanata ; antherae usque ad 8 mm. longae, exteriores connectivo late lineari 3–4 mm. longo. *Carpella* circiter 18, stigmatibus late oblanceolatis apice triangularibus.

Northern Rhodesia : near pool in slowly running water, stream 6 miles north of Kasama, 1350 m., 23 July 1930, *Hutchinson and Gillett* 4045 (see p. 235).

Monotes cordatus *Hutch.* sp. nov. [Dipterocarpaceae] ; foliis magnis basi conspicue cordatis, sepalis fructiferis anguste obovatis distincta.

Arbor 10 m. alta ; ramuli annotini breviter stellato-pubescentes. *Folia* late elliptica, basi cordata et supra glandulo magno instructa, apice late emarginata, 10–18 cm. longa, 8–10 cm. lata, supra furfuraceo-glandulosa, infra breviter pubescentia et crebre reticulata, nervis lateralibus utrinsecus 12–16 a costa sub angulo 60°–70° abeuntibus prominentibus, nervis tertiariis subparallelis plerumque furcatis prominentibus ; petioli 1·5–2 cm. longi, stellato-tomentelli. *Flores* non visi. *Sepala* fructifera anguste obovata, apice rotundata, basi breviter attenuata, 4–6·5 cm. longa, 1·5–3 cm. lata, utrinque minutissime stellato-puberula, 5–7-nervia, reticulata. *Fructus* depresso-globosus, circiter 1·8 cm. diametro, appresse pubescens.

Northern Rhodesia : 20 miles south west of Serenje Corner, 1750 m., fr. 15 July 1930, *Hutchinson and Gillett* 3703 (type) ; Solwezi Distr., Mutanda Bridge, fr. June, *Milne-Redhead* 598 ; Chitambo Mission, fr. June, *Stevenson* 64 ; 142.

Monotes glandulosissimus *Hutch.* sp. nov., insignis foliis ellipticis basi plerumque cordatis supra in nervorum inferiorum axillis 5–6-glandulosis.

Arbor 6·5 m. alta ; ramuli annotini breviter pubescentes, hornotini molliter tomentosi. *Folia* elliptica, basi plerumque cordata, apice rotundata et mucronata vel plerumque late emarginata vel subbilobata, 6–10 cm. longa, 3·5–5·5 cm. lata, supra breviter

pustulato-puberula, in nervorum inferiorum axillis prominente nigro-glandulosa, infra molliter pubescentia et crebre reticulata, nervis lateralibus utrinsecus 13–15 a costa sub angulo 45° abeuntibus infra prominentibus marginem versus leviter curvatis, nervis tertiariis gracilibus furcatis; petioli vix 1·5 cm. longi, molliter tomentelli. *Inflorescentia* anguste paniculata, subspiciformis, circiter 10 cm. longa, ubique molliter tomentosa; bracteae ovatae, acutae, concavae, extra pubescentes. *Sepala* valde imbricata, ovato-orbicularia, 3 mm. longa, leviter carinata, crassa, tomentella. *Petala* late oblongo-oblanceolata, circiter 8 mm. longa, extra appresse tomentosa, unilateraliter membranacea, intra basi appresse villosa. *Stamina* numerosa, petalis dimidio breviora, filamentis gracilibus glabris. *Ovarium* globosum, dense pubescens, stylo ovario breviore coronatum. *Fructus* ellipsoideo-globosus, vix 1 cm. diametro, sericeo-tomentosus. *Sepala* fructifera obovato-oblanceolata, circiter 2 cm. longa, utrinque stellato-puberula.

Northern Rhodesia: 7½ miles north-east of Lusaka, 1300 m., tree 20 ft. in *Brachystegia* forest, flowers cream, 12 July 1930, *Hutchinson and Gillett* 3595 (type); between Minga River and Sewa, about 300 miles N.E. of Lusaka, slender tree 35 ft., fr. Aug., *Burtt Davy* 950; Great East Road, 73 miles east of Lusaka, fr. Aug., *Burtt Davy* 857.

Monotes lukuluensis *Hutch.* sp. nov.; foliis magnis basi rotundatis infra crebre reticulatis parce pubescentibus, sepalis fructiferis elongatis angustissimis distinctissima.

Arbor circiter 7 m. alta; ramuli annotini rugulosi, breviter et parce pubescentes. *Folia* late obovato-elliptica, apice late emarginata, basi rotundata sed vix cordata, glandulo magno instructa, 8–15 cm. longa, 6–10 cm. lata, supra minute furfuraceo-glandulosa, infra breviter pubescentia et crebre reticulata, nervis lateralibus utrinsecus circiter 15 a costa sub angulo 45° abeuntibus prominentibus ad marginem conjunctis, nervis tertiariis plus minusve parallelis et distinctis; petioli 2 cm. longi, teretes, minute pubescentes. *Flores* non visi. *Sepala* fructifera elongato-oblongo-oblanceolata, apice obtusa vel rotundata, basi angustata, usque ad 5·5 cm. longa et 1 cm. lata, utrinque stellato-puberula, 5-nervia, reticulata. *Fructus* depresso-globosus, obtuse mucronatus, molliter sed parce pubescens.

Northern Rhodesia: Lukulu River, tree about 20 ft. high, 16 July 1930, *Hutchinson and Gillett* 3741.

Monotes obliquinervis *Hutch.* sp. nov.; foliis utrinque cuneato-angustata, nervis lateralibus valde obliquis et prominentibus, sepalis fructiferis fere lineari-oblanceolatis distincta.

Arbor 7 m. alta; ramuli annotini molliter tomentosi. *Folia* obovato-elliptica vel anguste rhomboideo-elliptica, utrinque plus minusve cuneato-angustata, 6–10 cm. longa, 4–6 cm. lata, supra primum molliter pubescentia demum glabrata, infra puberula et crebre reticulata, nervis lateralibus utrinsecus circiter 10–12 valde

obliquis infra prominentibus et parallelis ; petioli teretes, 1–1·5 cm. longi, tomentelli. *Inflorescentia* paniculata, multiflora, interdum foliis minoribus instructa ; bracteae caducae, extra molliter pubescentes ; pedicelli usque ad 3 mm. longi. *Sepala* ovata, carinata, 4 mm. longa, tomentosa. *Petala* oblongo-lanceolata, fere 1 cm. longa, extra tomentella, intra basin versus appresse pubescentia. *Ovarium* dense tomentosum. *Fructus* ovoideo-globosus, rostratus, tomentosus, sepalis persistentibus fere lineari-oblanceolatis rubescentibus circumdatus.

Northern Rhodesia: 8 miles south of Mpulunga, 1100 m., fl. and young fruit July 1930, tree 20 ft., flowers cream, calyx red in fruit, *Hutchinson and Gillett* 3963.

Monotes oblongifolius *Hutch.* sp. nov. ; foliis oblongis nervis lateralibus intra marginem evanidis venis haud conspicuis distincta.

Arbor circiter 8 m. alta ; ramuli rugosi, brevissime pubescentes. *Folia* oblonga, utrinque rotundata vel basi breviter cordata, 6–8 cm. longa, 2·5–3·5 cm. lata, supra puberula, basi glandulosa, infra crebre tomentella, nervis lateralibus utrinsecus 9–11 marginem versus subevanidis et leviter curvatis ; petioli supra anguste sulcati, 1–1·5 cm. longi, parce pubescentes. *Flores* non visi. *Fructus* depresso-globosus, 1–1·3 cm. diametro, verrucosus, molliter tomentellus. *Sepala* fructifera rubra, oblongo-oblanceolata, circiter 4 cm. longa, utrinque minutissime stellato-puberula, conspicue nervosa.

Northern Rhodesia : Kaloswe, at foot of kopje, tree 25 ft., fr. July, *Hutchinson and Gillett* 3765.

Monotes tomentellus *Hutch. et Milne-Redhead* sp. nov. ; affinis *M. Engleri* Gilg, sed foliis minoribus nervis lateralibus paucioribus a costa sub angulo latiore abeuntibus differt.

Arbor parva ; ramuli annotini leviter flexuosi, cortice longitudinaliter fisso, hornotini tomentelli. *Folia* elliptica vel leviter elliptico-obovata, apice rotundata vel late emarginata, breviter mucronata, basi subcordata vel rotundata et conspicue glandulosa, 4·5–7·5 cm. longa, 2·5–5 cm. lata, supra puberula demum fere glabra et areolato-reticulata, infra molliter tomentella et inconspicue reticulata, nervis lateralibus utrinsecus 9–12 e costa media sub angulo 45° abeuntibus marginem versus furcatis supra fere immersis infra valde conspicuis ; petioli graciles, circiter 1 cm. longi, teretes, tomentelli ; stipulae mox deciduae, spatulato-lanceolatae, 5 mm. longae. *Inflorescentiae* axillares, pauciflorae, foliis multo breviores, ubique molliter tomentosae ; bracteae mox deciduae, lanceolatae. *Sepala* ovato-orbicularia, circiter 2·5 mm. longa. *Petala* oblongo-lanceolata, apice rotundata, circiter 1 cm. longa, 3·5 mm. lata, extra tomentella, intra parce puberula. *Stamina* circiter 6 mm. longa, glabra. *Ovarium* piloso-tomentosum ; stylus glaber. *Fructus* subglobosus, rostratus, 1 cm. longus, sicco corrugatus, breviter tomentosus. *Sepala* fructifera plerumque 6, oblongo-oblanceolata, usque ad 3·5 cm. longa et 1 cm. lata, reticulata, parce stellato-pubescentia.—

M. hypoleucus Bak. f. in Journ. Linn. Soc. Bot. 40 : 27; Eyles in Trans. Roy. Soc. S. Afr. 5 : 421 (1916), non Gilg.

Southern Rhodesia: Salisbury, occasional in savannah forest, 1550 m., fl. Dec., Jan., *Eyles* 4555, 4646; Odzani River Valley, *Teague* 431 (type). Buzi district, *Swynnerton* 157, 1314.

Ochthocosmus Gillettae *Hutch.* sp. nov. [Erythroxylaceae]; foliis parvis superne denticulatis racemis numerosissimis foliis brevioribus distincta.

Arbor circiter 7 m. alta, floribus praecoceibus albidis numerosissimis obtecta; ramuli breviter pubescentes. *Folia* decidua, oblongo-oblanceolata vel oblongo-elliptica, apice obtusa vel breviter et late acuminata, basi acute cuneata, 4–7 cm. longa, 1·3–3 cm. lata, superne denticulata, glabra, utrinque crebre sed obscure reticulata; petioli brevissimi. *Racemi* numerosi, circiter 3 cm. longi; axis molliter pubescens; pedicelli 3 mm. longi, glabrescentes; bracteae ovatae, parvae, brunneae. *Sepala* ovato-orbicularia, extra basi minute pubescentia. *Petala* late obovato-orbicularia, 4 mm. longa, glabra, multistriata. *Stamina* margine disci inserta; filamenta gracilia, petalis aequilonga. *Ovarium* glabrum; stylus glaber, 3 mm. longus. *Fructus* sepalis et petalis persistentibus crebre cinctus, obovoideo-ellipticus, 8 mm. longus, glaber.

Northern Rhodesia: open woodland by stream 7 miles northwest of Abercorn, 1500 m., tree 20 ft., covered with small white flowers, July, *Hutchinson and Gillett* 3910 (type); Lunzua valley, near stream, 1100 m., fr. July, *Hutchinson and Gillett* 3975 (see p. 236).

Faurea argentea *Hutch.* sp. nov. [Proteaceae]; foliis argenteis utrinque crebre tomentellis valde distincta.

Arbor 5 m. alta, ubique argentea; ramuli annotini parce lanati, hornotini cinereo-tomentosi, dense foliati. *Folia* late oblanceolata, ad basin attenuata, apice abrupte apiculata, 9–12 cm. longa, 2·5–3·5 cm. lata, utrinque cinereo-tomentella, nervis lateralibus utrinsecus 9–10 infra vel supra medium bifurcatis utrinque prominulis; petioli circiter 5 mm. longi, supra complanati. *Inflorescentia* terminalis, multiflora, leviter curvata, circiter 10 cm. longa et 3 cm. lata, brevissime pedunculata; bracteae ovato-triangulares, tomentosae, 2 mm. longae. *Perianthium* alabastro 1·5 cm. longum, superne clavatum, extra appresse tomentosum, limbo ellipsoideo obtuso circiter 5 mm. longo, tubo inferne lateraliter fisso stylo mox exserto. *Squamae hypogynae* late triangulares, glabrae. *Receptaculum* intra squamas dense et longissime villosum. *Antherae* 3 mm. longae. *Ovarium* glabrum; stylus infra medium curvatus, glaber.

Northern Rhodesia: near Serenje Corner, 1650 m., edge of *Brachystegia* wood, tree 15 ft., July, *Hutchinson and Gillett* 3707.

A very handsome silvery-leaved *Faurea* quite distinct from any known species. It grew at the edge of the forest in sandy soil (see p. 234).

Cryptosepalum fruticosum *Hutch.* sp. nov. [Caesalpiniaceae] ; *C. exfoliato* De Wild. peraffinis sed inflorescentia multiflora glabra differt.

Frutex usque ad 4 m. altus ; ramuli purpurascentes, dense lenticellati, junioribus glabris. *Foliola* 4–5-juga, e basi ad apicem foliorum sensim majora, oblique oblongo-elliptica, apice rotundata, basi inaequilateraliter cuneata, inferiora circiter 2·5 cm. longa, superiora usque ad 7 cm. longa et 3 cm. lata, glabra, laxe reticulata ; stipulae mox deciduae. *Flores* praecoces, rosei. *Racemi* multiflori, graciles, usque ad 10 cm. longi, glabri ; pedicelli 5–8 mm. longi. *Bracteolae* late obovato-rotundatae, 6–7 mm. longae, intra marginem minute puberulae. *Calyx* carnosus, disciformis. *Petalum* ovatum, apice rotundatum, basi late cuneatum, bracteolis leviter longior, striato-reticulatum. *Stamina* 3 ; antherae purpureae, 2·5 mm. longae. *Ovarium* breviter stipitatum, glabrum, stigmate suborbiculari. *Fructus* non visus.

Northern Rhodesia : 18 miles north-west of Abercorn, shrub 12 ft., flower-buds pink, *Hutchinson and Gillett* 3947 (see p. 238).

Pteronia Smutsii *Hutch.* sp. nov. [Compositae] ; foliis anguste oblanceolatis glanduloso-punctatis triplinerviis distinctissima.

Frutex laxe divaricatus usque ad 2 m. altus ; ramuli annotini longitudinaliter sulcati, glabrescentes, hornotini superne foliati, brevissime pubescentes, internodiis brevibus. *Folia* alterna, anguste oblanceolata, apice subacuta, basi acute attenuata, 2·5–4 cm. longa, usque ad 1 cm. lata, obscure triplinervia, utrinque glanduloso-punctata et scabridula. *Capitula* solitaria, alabastro anguste ovoidea demum ellipsoidea, 3 cm. longa, circiter 1·5 cm. diametro. *Involucri bracteae* 6–7-seriatae, paleaceae, glabrae, exteriores triangulares et minute ciliatae, intermedeae ovato-ellipticae et mucronatae, interiores elongato-oblongae, circiter 2 cm. longae. *Flores* aurantiaci, numerosi. *Corollae tubus* anguste tubulosus, 1·4 cm. longus, glaber, lobis anguste triangulari-lanceolatis acutis circiter 3 mm. longis. *Achaenia* villosa, circiter 7 mm. longa. *Pappus* pallide stramineus, usque ad 1·5 cm. longus.

Northern Rhodesia : stony mountain top at the crest of escarpment a few miles south-west of Lake Tanganyika, 1600 m., 21 July 1930, collected by J. C. Smuts, Mrs. Gillett and J. B. Gillett—*Hutchinson and Gillett* No. 3979.

Comments on the discovery of this species and distribution of the genus appear on pages 239, 240, 241.

Aster brevipedunculatus *Hutch.* sp. nov. [Compositae] ; affinis *A. fruticoso* Linn., sed pedunculis brevioribus conspicue bracteatis differt.

Frutex usque ad 1·3 m. altus ; rami virgati, cortice brunneo glabro obtecti ; ramuli laxe foliati. *Folia* plana, anguste oblanceolato-linearia, apice subacuta, basi angustata et conspicue decurrentia, circiter 2 cm. longa et 2·5 mm. lata, glabra, sicco subrugulose-reticulata. *Capitula* terminalia, solitaria, breviter pedunculata,

circiter 2·5 cm. diametro; pedunculi foliis vix longiores, parce bracteati; bracteae lineares, 2·5 mm. longae, extra glabrae, intra inferne breviter villosae. *Involucri bracteae* circiter 4-seriatae, ab exteriori gradatim longiores, usque ad 7 mm. longae, brevissime ciliolatae. *Flores radii* lilacini; corollae tubus 3 mm. longus, glaber; lamina anguste oblanceolata, 1 cm. longa, apice integra. *Flores disci* pallide flavi. *Achaenia* angustata, appresse pubescentia. *Pappus* duplex, setis exterioribus brevissimis, interioribus corollae tubo aequilongis albis.

Northern Transvaal: Western Zoutpansberg; Crewe Farm, 1400 m., among boulders, Aug., *Hutchinson and Gillett* 4419 (type); mountains 5 miles west of Wylie's Poort, at edge of evergreen scrub, 1550 m., *Hutchinson and Gillett* 4383 (see notes on p. 244).

Cineraria monticola *Hutch.* sp. nov. [Compositae]; affinis *C. deltoideae* Sond., sed foliis lobulatis et repando-denticulatis achaeniis dorso parce setulosis differt.

Herba usque ad 1 m. alta; caules simplices vel subsimplices, leviter costati, parce lanati, demum glabrescentes, internodiis plerumque circiter 5–7 cm. longis. *Folia* ambitu late ovato-orbicularia vel suborbicularia, basi truncata vel aperte cordata, apice triangularia, usque ad 8 cm. diametro, lobulata et repando-denticulata, supra glabra vel fere glabra, infra tenuiter albo-lanata demum glabrescentia; petioli basi auriculati, usque ad 4 cm. longi. *Corymbi* divaricati, multicapitulati; bracteae lineari-lanceolatae, acutissimae, basi auriculatae; pedunculi ultimi graciles, circiter 5 mm. longi, apicem versus parce bracteolati. *Capitula* flava, radiata, circiter 2 cm. diametro. *Involucri bracteae* 8–10, anguste oblongae, 6–7 mm. longae, apice triangulari-subacutae et breviter ciliolatae, margine membranaceae, extra sicco glabrae et distincte lineato-striatae. *Flores radii* 5–8; corollae tubus elongatus, 4 mm. longus, glaber; lamina anguste elliptica, 6–7 mm. longa, apice minute tridentata; ovarium laeve. *Achaenia* compressa, dorso parce setulosa. *Pappus* albus, 5–6 mm. longus.

Northern Transvaal: Zoutpansberg; ascent to Wylie's Poort from Louis Trichardt, herb 2–3 ft., ray-flowers deep yellow, June, *Hutchinson and Gillett* 3201.

Key to Rhodesian species of *Monotes*.

Leaves glabrous below, oblong, with a single gland at the base, with 8–10 pairs of lateral nerves; young branchlets glabrous...1. *glaber*.
Leaves more or less tomentellous or tomentose below:
*Leaves with a solitary gland at the base, the lower lateral nerves without glands at the base:
Leaves more or less rhomboid, the upper half somewhat triangular and pointed, narrowly rounded or broadly wedge-shaped at the base; lateral nerves very oblique, 10–12 pairs; reticulation very marked; fruiting sepals narrowly oblanceolate, much narrowed to the base.....2. *obliquinervis*.

Leaves more or less rounded at each end (rarely shortly pointed at the apex), not rhomboid :
Leaves roughly woolly-tomentose with loose hairs below, more or less cordate :
Leaves shortly and abruptly acuminate, with 12–14 pairs of lateral nerves ; flowers densely glomerate in small sessile clusters..... 3. *dasyanthus.*
Leaves rounded or emarginate at the apex, with 16–18 pairs of lateral nerves ; flower-clusters shortly pedunculate...4. *discolor.*
Leaves shortly tomentose or tomentellous below :
Leaves deeply cordate at the base, elliptic, rather large, averaging about 15 cm. by 8 cm., closely reticulate below ; lateral nerves 16–18 pairs ; fruiting sepals slightly and shortly narrowed at the base.....5. *cordatus.*
Leaves rounded or only shallowly cordate at the base ; lateral nerves up to 14 pairs ; fruiting sepals usually attenuated to the base :
Leaves very broadly elliptic or suborbicular-elliptic, less than twice as long as broad, strongly reticulate below :
Fruiting sepals narrowly oblanceolate, narrowed from above the middle to the base, about 5 cm. long ; lateral nerves about 14 pairs ; fruits depressed-globose.....6. *lukuluensis.*
Fruiting sepals broadly oblong-oblanceolate, fairly broad nearly to the base, about 3 cm. long ; lateral nerves 10–12 pairs ; fruits ovoid-globose.....7. *Homblei.*
Leaves oblong or oblong-elliptic, usually more than twice as long as broad :
Lateral nerves 12–14 pairs ; reticulation very marked below :
Fruiting sepals only slightly narrowed to the base, less than twice as long as broad ; tertiary nerves very conspicuous and parallel.....8. *caloneurus.*
Fruiting sepals much narrowed to the base and more than twice as long as broad ; tertiary nerves not very conspicuous.....9. *Engleri.*
Lateral nerves up to about 10 pairs ; reticulation usually not very marked below :
Leaves over twice as long as broad, the lateral nerves rather fading towards the margin : Northern Rhodesia..... 10. *oblongifolius.*
Leaves usually less than twice as long as broad :
Leaves broadly rounded or subcordate at the base ; lateral nerves rather distinct and not markedly oblique ; South-eastern Rhodesia .....11. *tomentellus.*
Leaves often slightly narrowed and not subcordate at the base ; lateral nerves rather close and markedly oblique ; North-west Rhodesia and Angola.....12. *angolensis.*
*Leaves with a gland in the axils of the lower nerves as well as at the base, elliptic, cordate at the base, softly tomentose below..... 13. *glandulosissimus.*

1. **Monotes glaber** *Sprague* in Kew Bull. 1909 : 305 ; Eyles in Trans. Roy. Soc. S. Afr. 5 : 421 (1916).

Northern Rhodesia : Solwezi Distr., Mutanda Bridge, fr. June, *Milne-Redhead* 576 ; Mwinilunga Distr., 40 miles south of Mwinilunga, fr. Aug., *Milne-Redhead* 938 ; Batoka Highlands, shrub, fr. July, Kirk ; Himyani Falls, tree 40–60 ft., *Allen* 734 ; Zimba, July-Aug. 1919, *Burtt Davy* 17865 ; 34 miles west of Livingstone, small tree, Aug., *Burtt Davy* 587 ; Great North Road, 66 miles north of Livingstone, Aug., *Burtt Davy* 685.

Southern Rhodesia : Beatrice, 4000 ft., medium-sized tree, fl. Dec., *Eyles* 4441 ; Selukwe, fr. Sept., *Walters* 2349 ; Darwin, *Swynnerton* 4022 ; Salisbury 1550 m., fl. Nov., *Eyles* 4549, 2814 ; *Rand* 557 ; Mazoe, *Hale* in Herb. *Eyles* 5268.

2. **M. obliquinervis** *Hutch.* sp. nov. (see p. 247).

3. **M. dasyanthus** *Gilg* in Baum, Kunene-Samb. Exped. 307 (1903).

Northern Rhodesia : Mwinilunga Distr., 40 miles south of Mwinilunga, fr. Aug., *Milne-Redhead* 941. Also in S. Angola.

4. **M. discolor** *R. E. Fries* in Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped. 1 : 153, t. 12, fig. 13-14.

Northern Rhodesia : Mporokoso, *R. E. Fries* 1175 (not seen).

5. **M. cordatus** *Hutch.* sp. nov. (see pp. 234, 246).

6. **M. lukuluensis** *Hutch.* sp. nov. (see pp. 234, 247).

7. **M. Homblei** *De Wild.* in Bull. Jard. Bot. Brux. 5 : 56 (1915).

Northern Rhodesia : Solwezi Distr., Mutanda Bridge, fr. July, *Milne-Redhead* 677.

Also in the Katanga region of the Belgian Congo.

8. **M. caloneurus** *Gilg* in Engl. Bot. Jahrb. 28 : 136 (1899) ; R. E. Fries in Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped. 1 : 154 (1914).

Northern Rhodesia : Mwinilunga Distr., 40 miles from Mwinilunga, fr. Aug., *Milne-Redhead* 942 ; Bwana Mkubwa, fr. Aug., *Fries* 326 and 368 (not seen). Also in Angola.

9. **M. Engleri** *Gilg* in Engl. Bot. Jahrb. 41 : 291, text fig. K. (1908).

Northern Rhodesia : Batoka Highlands, *Kirk* ; Zimba, *Burtt Davy* 19984 ; Kashitu R., 1300 m., fl. and young fr. July, *Rogers* 8304 ; near Mumbwa, *Macaulay* 743 ; between Choma and Mapanza, fl. May, *Rogers* 7665 ; between Choma and Pemba, fr. Aug., *Burtt Davy* 703 ; Bolunga Camp, E. of Kafue, fr. Dec., *Shantz* 454 ; Kambole, S.W. of Lake Tanganyika, 1650 m., *Nutt* ; Munali Pass, Nega Nega Hills, fl. Aug., *Burtt Davy* 770 ; near Umtali, *Engler* 3159 (type). Also in the Katanga Region of the Belgian Congo.

10. **M. oblongifolius** *Hutch.* sp. nov. (see p. 248).

11. **M. tomentellus** *Hutch. & Milne-Redhead*, sp. nov. (see p. 248).

12. **M. angolensis** *De Wild.* ex *Exell* in Journ. Bot. 1928 : Suppl. 1 : 31.

Northern Rhodesia : Solwezi Distr., Mutanda Bridge, fr. July, *Milne Redhead* 673. Also in Angola.

13. **M. glandulosissimus** *Hutch.* sp. nov. (see p. 246).

Note.—I have not seen the specimens listed by Eyles (Trans. Roy. Soc. S. Afr. 5 : 421) as *M. africanus* var. *denudans* Hiern.

XXXVI.—THE GENUS KRAUSSIA.

A. A. Bullock.

In 1842 Harvey described a Rubiaceous plant collected by Krauss (No. 121) near Durban under the name *Kraussia floribunda*, thereby establishing a new monotypic genus. Later (1850), Sonder described two other species which he named *K. coriacea* and *K. lanceolata*, and in the Flora Capensis (iii. 22) Harvey himself added a fourth species, *K. pavettoides*. In 1876 a fifth species, *K. congesta*, was described by Oliver, and in this state the genus remained until Bentham and Hooker dealt with it in the second volume of their "Genera Plantarum" In this work they excluded Harvey's *K. pavettoides*, transferring it to *Webera* (now known as *Tarenna*), and from the remaining species they drew up a revised description which scarcely distinguished *Kraussia* from *Tricalysia*, the next genus in their classification. The only definite differential character was the degree of immersion of the ovules in the placenta.

In the Flora of Tropical Africa (iii. 117) Hiern (who in this work dealt only with Tropical African species) reduced *Kraussia* to *Tricalysia*, and this no doubt led Schumann to treat it as a synonym in his account of the Rubiaceae in the "Pflanzenfamilien." Schumann* retained the name *Kraussia* for his first section of *Tricalysia*, citing *T. ovalifolia* Hiern and *T. Sonderiana* Hiern (=*Kraussia coriacea* Sond.—*vide infra*) as typical members of the section.

It should be noted that none of the later authors, from Sonder (1850) onwards, regarded *Kraussia* as monotypic, or recognised that the species which had been added were not really congeneric with Harvey's *K. floribunda*.

Other writers, including Sim (For. Fl. Cape Col. 240), have been undecided as to the status of *Kraussia*, and in maintaining it have depended largely on the lobation of the calyx and corolla, a character so variable in *Tricalysia* as to be valueless.

The only extension of Harvey's generic description necessary in order to include the two new species described below, which so much resemble *K. floribunda* in general appearance as to leave no doubt that they are congeners, refers to the number of ovules in each of the two ovary-cells. In *K. floribunda* they are solitary, whereas in the other two species they are geminate ; in all three they are almost

*In Engl. et Prantl, Nat. Pflanzenf. iv. 4 : 81 (1897).

completely immersed in the fleshy placentas, which are attached to the middle of the septum.

Tricalysia and *Kraussia* are readily separable by means of the following diagnostic key :—

Style long-filiform or linear, much exceeding the spreading arms ; flowers usually in modified cymes, usually congested, the cyme-branches very short ; ovules geminate or more numerous .....*Tricalysia* A. Rich. ex DC.

Style short, fleshy, somewhat bulbous, much shorter than the coherent style-arms, the latter lamellate outside ; flowers in simple lax bracteolate cymes, the cyme-branches comparatively long ; ovules solitary or geminate.....*Kraussia* Harv.

Kraussia *Harv.*

Harv. in Hook., Lond. Journ. Bot. i. 21(1842) ; Sond. in Harv. et Sond., Fl. Cap. iii. 22 (1864-5) partim ; Benth. et Hook f., Gen. Pl. ii. 95 (1873) partim.

Key to the species.

Leaves comparatively small, subsessile, lanceolate to narrowly ovate-lanceolate, up to 8 cm. long and 2·5 cm. broad :

Calyx-lobes rounded ; leaf apex obtuse to subacute, the base rounded or abruptly decurrent (Natal).....1. *K. floribunda* Harv.

Calyx-lobes acute ; leaf apex very acute or somewhat acuminate, the base cuneate (Transvaal).....2. *K. incerta* Bullock.

Leaves large, distinctly petiolate, oblong, up to 14 cm. long and 5·5 cm. broad, apex acute or abruptly acuminate, rounded at the base ; calyx-lobes very acute .....3. *K. speciosa* Bullock.

1. **Kraussia floribunda** *Harv.* in Hook., Lond. Journ. Bot. i. 21 (Jan. 1842), et Thes. Cap. 13, t. 21 (1859) ; Sond. in Harv. et Sond., Fl. Cap. iii. 22 (1864-5) ; J. M. Wood, Fl. Natal 61 (1907), et in Trans. South African Phil. Soc. xviii. 164 (1908)* ; Sim, For. Fl. Cape Col. 240 (1907) excl. descr. stigmat.

Coffea Kraussiana Hochst. in Flora xxv. 237 (April, 1842).

Tricalysia floribunda (Harv.) Stuntz in U.S. Dept. Agric., Bur. Pl. Ind., Invent. Seeds and Pl. Import. No. 32, 39 (1914).

South Africa. Natal : Durban, *Krauss* 121 (type) ; *Gueinzius* s.n. ; *Williamson* s.n. ; *Sanderson* s.n. ; *Gerrard* 21 ; *Cooper* 1239 ; *Rudatis* 1488. Inanda, *Wood* 418. Warner Beach, 20 miles south of Durban, *Dyer* 932.

The style and stigma of this plant are exactly similar to those of the following species. The style is somewhat swollen, and is considerably shorter than the lamellate arms, the latter being coherent by means of their interlacing marginal cilia. I believe that these interlocking cilia have not been previously noted.

*Revised List of the Flora of Natal.

2. **Kraussia incerta** *Bullock*, sp. nov. ; valde affinis *K. floribundae* Harv., sed foliis pro rata angustioribus basi et apice acutis, lobis calycinis acutis differt.

Frutex vel arbor parva, glabra ; ramuli subquadrangulares. *Folia* lanceolata, apice acuta vel subacuminata, basi cuneata, usque 8 cm. longa et 2·3 cm. lata, subsessilia vel breviter petiolata, nervis lateralibus utrinsecus 3–4 indistinctis ; stipulae acuminato-triangulares, 3–5 mm. longae, intus dense villoso-pubescentes. *Cymae* axillares, bracteatae ; pedunculi usque 1·5 cm. longi ; pedicelli usque 5 mm. longi ; bracteae lineari-lanceolatae, infimae circiter 3 mm. longae. *Calyx* fere usque ad basin 5-lobus, lobis ovatis acutis 1·5 mm. longis. *Corollae* tubus turbinatus, 4·5 mm. longus, intus ad medium annulo indumenti dense villosi instructus, lobis alabastro conspicue contortis sub anthesin patentibus oblongo-ovatis subacutis 7 mm. longis et 3 mm. latis. *Stamina* corollae tubo supra annulum villosum inserta, filamentis subobsoletis antheris exsertis linearibus apiculatis 6 mm. longis dorso puberulis basin versus dorsifixis. *Ovarium* 2-loculare, ovulis geminatis in placento crasso immersis ; stylus carnosus, cylindricus vel leviter ellipsoideus, circiter 4 mm. longus, ramis circiter 6·5 mm. longis satis crassis aequilongis extra longitudinaliter lamellatis, marginibus ciliis brevibus cohaerentibus. *Discus* annularis cupuliformis, laevis. *Drupa* (? immatura) globosa, 7 mm. diametro.

South Africa. Transvaal : Komati Poort, Nov.-Dec., *Kirk* 67 ; *Pole-Evans* H. 16909 (type) ; *Rogers* 22217.

3. **Kraussia speciosa** *Bullock*, sp. nov. ; affinis *K. floribundae* Harv., sed foliis oblongo-ellipticis majoribus, stipulis et calyce multo majoribus, corollae lobis acutis differt.

Arbor parva, glabra, usque ad 10 m. alta, caule debili ; ramuli subquadrangulares. *Folia* oblongo-elliptica, late acuminata, basi rotundata, usque ad 14 cm. longa et 5·5 cm. lata, nervis lateralibus utrinsecus 7–8 ; petioli 0·8–1 cm. longi ; stipulae ovato-triangulares, acutae, 1 cm. longae, intus villoso-pubescentes. *Cymae* leviter supra-axillares, longe pedunculatae, laxe multiflorae, bracteatae ; pedunculi 5–7 cm. longi, pedicellis 1–1·5 cm. longis ; bracteae lineari-lanceolatae, infimae usque ad 1 cm. longae. *Calyx* fere ad basin 5-lobus, lobis triangulari-lanceolatis acutissimis 4 mm. longis minute ciliolatis. *Corollae* tubus turbinato-campanulatus 7 mm. longus, intus ad medium annulo indumenti dense villosi instructus, lobis alabastro conspicue contortis sub anthesin patentibus ovato-lanceolatis acutis 1·3 cm. longis 6 mm. latis. *Stamina* corollae tubo supra annulum villosum inserta, filamentis filiformibus brevissimis, antheris exsertis linearibus vel lineari-lanceolatis apiculatis 9 mm. longis basin versus dorsifixis. *Ovarium* 2-loculare, ovulis geminatis in placento crasso immersis ; stylus carnosus, cylindricus vel leviter globosus, 5 mm. longus, ramis 1·3 cm. longis satis crassis inaequilongis extra longitudinaliter lamellatis marginibus ciliis longissimis cohaerentibus. *Discus* annularis, laevis. *Fructus* non visus.

Tropical Africa. Tanganyika Territory: Kimboza Mikese-Kisaki Road, 1500 ft. alt., a small tree up to 30 ft. high, growing in Rain Swamp forest in black soil on a limestone formation, 4 Sept., 1930, *Greenway* 2516 (type).

Excluded species.

1. *Kraussia congesta* Oliv. in Journ. Linn. Soc. Bot. xv. 95 (1876), is **Tricalysia congesta** (*Oliv.*) *Hiern* in Oliv., Fl. Trop. Afr. iii. 120 (1877).

2. *Kraussia coriacea* Sond. in Linnaea xxiii. 53 (1850) was transferred to *Tricalysia* under the (then) illegitimate name *T. Sonderiana* Hiern in Oliv., Fl. Trop. Afr. iii. 119 (1877). In the same work (p. 120) Hiern also described another species under the name *T. coriacea* Hiern. The original *Kraussia coriacea* Sond. may therefore still be known as **Tricalysia Sonderiana.**

3. *Kraussia lanceolata* Sond. in Linnaea xxiii. 53 (1850) is **Tricalysia lanceolata** (*Sond.*) *Burtt Davy* in Ann. Transv. Mus. iii. 122 (1912). This is figured by Wood on plate 231 of his "Natal Plants," and by Sim on plate 85 (fig. 1) of his Forest Flora of Cape Colony.

4. *Kraussia pavettoides* Harv. in Harv. et Sond., Fl. Cap. iii. 22 (1864-5), is **Tarenna pavettoides** (*Harv.*) *Sim*, For. Fl. Cape Col. 239 (1907).

XXXVII.—THE FLORA OF MADRAS: VII.*

The ninth part (pp. 1533-1687) *Commelinaceae* to *Cyperaceae* has now been published, and Mr. Fischer has drafted the following notes in continuation of those previously published.

Notes on the Flora of Madras: Part IX.
C. E. C. Fischer.

Forrestia.

F. mollis Hassk. In Fl. Br. Ind. vi. 383, the habitat of this species is given as "Malabar, J. Anderson," but C. B. Clarke (De Candolle Monogr. iii. 236) has quoted "Java; Montes Malabar," which refers to Mount Malabar in Java. The entry in the former work, therefore, is misleading. As I have seen no specimen of the species from peninsular India, nor any of the genus from S. India, it has been excluded.

Aneilema.

Page 1545. *A. esculentum* Wall. and *A. dimorphum* Dalz. I am not satisfied that these two species are really distinct. The details and dimensions given by C. B. Clarke (l.c. 206) are not constant. The one feature that may be decisive—the tuberous roots of the first named—is lacking in most herbarium specimens, thus precluding the possibility of judgment on its constancy. I have, however, retained both species.

*Continued from *K.B.* 1928, p. 285.

Cyanotis.

Page 1549. *C. pilosa* Roem. & Sch. and *C. Wightii* C. B. Clarke. I cannot distinguish these two species. Specimens named by C. B. Clarke as one or the other species appear to me to be identical. The descriptions in DC. Monogr. iii. 250 and 251 do not offer clear distinctive characters. I am of opinion that the two are really the same, and have classed all the specimens under the former name.

Page 1551. *C. kewensis* C. B. Clarke and *C. vivipara* Dalz. For reasons for reviving the genus *Belosynapsis* see *K.B.* 1928, 254.

Calamus.

Page 1562. Of Palms generally, but especially of the genus *Calamus*, it may be said that herbaria are usually sadly deficient in satisfactory material. The several parts often vary greatly in different regions of the plant, particularly in the arrangements of the leaflets along the rhachis and of the spines. With dioecious species sometimes one sex only is represented ; often the inflorescence is unsupported by vegetative parts, but more frequently it is the reverse. Consequently, the descriptions, even Beccari's, do not always present the full details required for the compilation of a satisfactory key ; the one provided is the best I could draw up in these circumstances. With regard to several species careful descriptions from living specimens are much needed.

Cryptocoryne.

Page 1575. *C. unilocularis* Wight is known only from a coloured drawing in Roxburgh's collection in Herb. Kew., which has been reproduced uncoloured as t. 774 of Wight's Icones. In Pflanzenr. iv. 23F, 237, Engler appears to refer to a specimen in Herb. Kew., but no such specimen is to be found ; probably the above-mentioned drawing was intended.

Page 1576. *C. Meeboldii* Engl. l.c. 234. I have seen the type specimen and find that the ovaries are in several rows, as figured in Fig. 61c (l.c. 242). The plant, therefore, is a *Lagenandra* and has been transferred as *L. Meeboldii*.

Theriophorum.

Page 1579. *T. infaustum* N. E. Brown. I am inclined to think this identical with *T. indicum* Engl., but I have seen only the two defective sheets of it. In the absence of further material I have thought it best to retain the species. As essential parts are unrepresented, I have had recourse to Engler's description under *T. Wightii* Engl. in DC. Monogr. ii. 608.

Arisaema.

Page 1585. *A. neglectum* Schott. I can find no character to distinguish this specifically from *A. tortuosum* Schott except that the leaflets are radiate and not pedate. In *A. tortuosum*, however, the leaflets are sometimes very nearly if not quite radiate. I consider, therefore, that *A. neglectum* is a doubtful variety of *A. tortuosum*.

A. pulchrum N. E. Br. was described in 1880 from a plant grown in an English garden (Mr. Bull's) introduced from "some part of India." On the type sheet in Herb. Kew. Mr. N. E. Brown has written: "Col. Beddome informed me (May 1882) that he sent this *Arisaema* to Mr. Bull. He discovered it in Sispara Ghat, 3000 ft. West Nilgerries." It seems probable that it may be an aberrant form of *A. Leschenaultii* Bl.

PLESMONIUM.

Page 1588. *P. margaritiferum* Schott. It is somewhat doubtful whether this species occurs within the area of the Flora. I have, however, seen three sheets with leaves only which seem to me to be this species, consequently I have thought it best to include it. The three sheets referred to are: *C. A. Barber* 1805, collected in June 1900 at Lakshmipuram, Vizagapatam District (in Herb. Madras.); *M. S. Ramaswami* 1589, collected 9th Aug. 1914 in the Rampa Hills "towards the top" (in Herb. Calc.); and *V. Narayanaswami* 194, collected on 26th Sept. 1920 in the Rampa Hills at 1500 ft. (in Herb. Kew.).

RHAPHIDOPHORA.

R. decursiva Schott. In Pflanzenr. iv. 23B, Engler has included the Rampa Hills in the habitat of this species on the strength of sheet no. 15946 in the late Mr. Gamble's Herbarium, now at Kew. This sheet consists of two separate leaves and an inflorescence. The latter is *R. pertusa* Schott, with truncate ovaries and sessile stigmas. One leaf has one side entire; the other side is cut into 4 lobes but the divisions do not reach to within 0·4 in. of the midrib. The other leaf is pinnatisect with an orbicular outline. There is a terminal lobe with 7 lateral unequal ones –4 on one side and 3 on the other—not reaching the midrib. In my opinion the sheet is *R. pertusa* Schott.

ERIOCAULON.

A difficult genus to work out with dried material. Once dry the ♂ calyx is very apt to split; great care is required in opening out or a spathaceous calyx may be mistaken for one with free lobes. Probably insufficient attention has been paid to the seeds; I am inclined to believe that they may furnish good characters. Unfortunately many specimens are not in the stage to yield ripe seeds for comparison.

Page 1618. *E. setaceum* Linn. and *E. intermedium* Koern. The only distinctions between these two species appear to lie in the darker colour of the bracts of the latter and in the white-villous floral bracts of the former. I have found, however, sparsely but distinctly white-hairy bracts in dark-coloured heads. In view of the great variability of the indumentum in the genus I follow Hooker and unite the two under the first name.

Page 1619. *E. Geoffreyi* Fyson in *K.B.* 1914, 330. The only distinction that I can find between this species and *E. melaleucum* Mart. lies in the black anthers of the former; but the original

description of the latter states that the anthers are white at first and later black. In one capitulum of a plant collected by Mr. E. Barnes in the Nilgiris (B. 26), which I consider to be undoubtedly *E. melaleucum*, I found both white and black anthers. I also found one pale-brown anther together with black ones in the same flower on one of the sheets quoted in Fyson's description of *E. Geoffryi* (*Fyson* 2165). I consider, therefore, that they are the same species. *E. melaleucum* Mart. and *E. Ritchieanum* Ruhl. are very closely related and I am a little doubtful of their specific separation. Their extreme forms may be distinguished by the following characters :

E. melaleucum. *Leaves* short, stiff, not visibly fenestrate. *Sheath*-mouth truncate though often irregularly split, sulcate and not visibly fenestrate. *Capitula* up to 0·35 in. diam. ; ♂ *sepals* more or less free.

E. Ritchieanum. *Leaves* long, lax, distinctly fenestrate. *Sheath*-mouth oblique, usually entire, distinctly fenestrate. *Capitula* up to 0·2 in. diam. ; ♂ *sepals* spathaceous.

But these characters are not always found combined, the sheaths and leaves being sometimes fenestrate with the large capitula and truncate sheaths. Also the ♂ sepals are often easily separable in the spathiform type and this may be a question of age. The chief distinction used by Ruhland is that afforded by the mouth of the sheath. For the present it is preferable to treat them as separate species on the characters given.

E. Rhodae Fyson. No constant difference is apparent between this and *E. robusto-Brownianum* Ruhl., which species is very variable in the colour of the involucral bracts and the amount of indumentum of the several parts. In his key to the section *Hirsutae* (Journ. Ind. Bot. ii. 262) Fyson includes them both in the group characterised by involucral bracts black or brownish at the base, but Ruhland described those of *E. robusto-Brownianum* as " pallide-stramineae " (Pflanzenr. iv. 30, 77) and in one sheet identified by Mr. Fyson as that species they are straw-coloured in some heads and brown in others. The distinction in Fyson's key (l.c.) runs :—

" Floral bracts acuminate, hairy, giving the head an echinate appearance .....*robusto-Brownianum*.
Floral bracts dirty white, nearly glabrous.....*Rhodae*."

A review of a considerable number of specimens, however, shows that the heads vary from one extreme to the other and the hairiness associated with the first is noticeable in a sheet (*Meebold* 8273) identified by Fyson as the latter. Accordingly I have sunk *E. Rhodae* Fyson in *E. robusto-Brownianum* Ruhl.

E. Thomasi Fyson. I have examined the two sheets (*Meebold* 9106 and 9899) quoted in the original description of this species and find that the ♀ petals do not always bear a black apical gland. I have also seen the type specimen of *E. Vanheurckii* Muell.-Arg. in Herb. DC. at Geneva, which Mr. Fyson has not mentioned in his review, and I have no doubt that the two are identical. In the description of

E. Vanheurckii the ♀ petals are stated to be glandless and I find this feature absent in a specimen from Travancore (*Calder & Ramaswami* 218). On the other hand, in one head from *Meebold* 9104 the glands were present though absent in others and all the flowers of *Meebold* 9899 examined by me were glandless. It would appear, therefore, that this character is variable. Hence I must treat *E. Thomasi* as synonymous with *E. Vanheurckii*.

E. horsleykondae Fyson. In Journ. Ind. Bot. iii. 16, Mr. Fyson has suggested the possibility of this species being identical with *E. Ritchieanum* Ruhl., which he had not seen. I have compared the type sheets of the two and find them identical. Moreover, I cannot distinguish Fyson's variety *megacephala* of *E. horsleykondae* from *E. melaleucum* Mart.

Page 1620. *E. Dianae* Fyson and vars. This is very closely related to *E. collinum* Hook. f. in which the sepals are very variable. The typical form and var. *longibracteata* differ very decidedly from *E. collinum* by the long involucral bracts, and var. *Richardiana* has very different leaves; but I cannot separate Fyson's vars. e and f, and have, therefore, sunk them under *collinum*. Var. g. *conica*, on the other hand, in my view, is quite distinct from both *E. collinum* and *E. Dianae*, nor does it appear to be *E. Roxianum* Steud. It differs from *E. Dianae* by the short involucral bracts, the elongate-conical receptacle producing a conical capitulum, the linear or linear-spathulate sepals shorter than the ligulate or ligulate-spathulate petals and the distinctly transversely-reticulate seeds. Hence I have raised it to specific rank as *E. conicum* (Fyson) Fischer.

E. collinum Hook. f. In a sheet collected at Pykara in the Nilgiri Hills (*Madras Herb.* 15248a) all the ♂ flowers in one head had 4 sepals, 4 petals and 8 stamens; in 2 other heads on the same plant the ♂ flowers were normally trimerous.

E. Thwaitesii Koern. In the original description of this species (Linnaea, xxvi. 627) the ♂ sepals are given as 2 in number. In the Fl. Br. Ind. vi. 583 they are given as 3. Fyson (Journ. Ind. Bot. ii. 202) says 3 with 1 smaller or 2. My dissections of a considerable number of ♂ flowers show 2 as a rule, rarely 3 equal or with 1 smaller. The peculiar capillary ♀ petals with tufted apex are constant in this species as well as in *E. Gamblei* Fischer.

CYPERACEAE.

Page 1621. It is probably more correct to treat *Pycreus*, *Juncellus* and *Mariscus* as sections of the genus *Cyperus*, but to do so would have involved a study of the groups extending far beyond the limits of the present Flora and a considerable delay in its preparation. For this reason, and because C. B. Clarke retained the separate genera in Fl. Brit. India, I have thought it better to follow his lead.

PYCREUS.

Page 1627. *P. ferrugineus* C. B. Clarke. I find it impossible to distinguish between this and *P. odoratus* Urb. (=*P. polystachyus* Beauv.), nor can I separate satisfactorily the type of *P. polystachyus*

from the var. *laxiflora* Benth. as there is a complete series of intermediate forms.

P. sulcinux C. B. Clarke. In the description in Fl. Br. Ind. vi. 593, the nut is stated to be "much flattened against the rhacheola." The sentence is ambiguous. In all specimens examined it is the edge of the nut furthest from the rhachis that is flattened, the other one being convex and fitting into a recess in the rhachis.

CYPERUS.

Page 1640. *Cyperus flavidus* Retz. Obs. v. 13 (1789). It appears that C. B. Clarke and other authors did not see the type specimen, which is in Herb. Lund. It is identical with *C. globosus* All. (=*Pycreus globosus* Reichb.=*P. capillaris* Nees) and is not, therefore, *Cyperus flavidus* of C. B. Clarke and other authors. *C. globosus* All. (1755) being an earlier name takes precedence, and another name must be found for *C. flavidus* C. B. Cl. non Retz. The oldest name is *C. tenuispica* Steud. (1855) and is now to be adopted.

Page 1641. *C. corymbosus* Rottb. and *C. tegetiformis* Roxb. After examining a number of specimens, many named by C. B. Clarke, I am unable to find any constant difference between these two species. Haines (Bot. Bihar and Or. v. 899-900) found a similar difficulty. I have decided, therefore, to treat them as identical.

C. tegetum Roxb. Dr. G. Kükenthal, who has seen the type of *C. Pangorei* Rottb., informs me that the two are identical. The latter is the earlier name.

C. rotundus L., *C. stenostachyus* Benth. var. *indica* C. B. Cl., *C. Fenzelianus* Steud., *C. subcapitatus* C. B. Cl., and *C. tuberosus* Rottb. I cannot find constant characters distinguishing these species. Several authors, including C. B. Clarke, have experienced the same difficulty and have remained in doubt. I consider them to be forms due rather to environmental conditions than to any inherent differences and I have, therefore, grouped all under the earliest name, *C. rotundus* L.

C. stoloniferus Retz. Trusting to a label of Mr. Foulkes on a sheet in Herb. Kew. which contains 6 plants and also labels of G. Thomson, C. B. Clarke (Fl. Br. Ind. vi. 615) has included "Nilghiri Mts" in the habitat. This is a most unlikely locality and I suspect that Foulkes' label has been wrongly placed on this sheet.

C. imbricatus Retz. Obs. v. 12 (1789) appears to have been entirely overlooked by C. B. Clarke, since no reference to it is to be found in Fl. Br. India or in his ms. monograph, though Wildenow mentions it in his edition of the Sp. Pl. i. 278. Vahl (Enum. ii. 367) considered it identical with his *C. fastigiatus*, which Kunth (Enum. ii. 20) merges in *C. eminens* Klein ms. and this latter C. B. Clarke sinks into *C. platyphyllus* R. & S. None of these authors can have seen the type specimen in Herb. Lund. By the kindness of Dr. C. Christensen I have been able to compare a spikelet of the type of *C. radiatus* Vahl (Enum. ii. 369-1805) with it and I find that there is no doubt that they are identical. *C. imbricatus* Retz. being the earlier name must now be adopted.

Mariscus.

Page 1644. *M. Dregeanus* Kunth. Dr. Kükenthal, who has seen the type specimen of *Cyperus dubius* Rottb., informs me that it is identical with the above species which, therefore, must become *M. dubius* (Rottb.) Kük. I have seen the type specimen of *Schoenus Bobartiae* Retz. Obs. iv. 9, and find that it also is identical with *M. dubius*.

M. ischnos C. B. Clarke. This species is alleged, in Fl. Br. Ind. vi. 623, to have been collected by G. Thomson in " Nilghiri and Kurg Hills " and is there stated to be " the single Old World example," the habitat, otherwise, lying in Tropical America. In his ms. monograph p. 2343, in a marginal note, C. B. Clarke has written " in herb. Hook. f. et T. Thoms. ' In montibus Nilghiri et Kurg ' inscriptum, est verosimiliter herbarii error."

Eleocharis.

Page 1648. *E. subvivipara* Boeck. I have not seen the type specimen but, after examination of a number of specimens so named by C. B. Clarke and comparison with the description, I have come to the conclusion that the only difference between it and *E. Chaetaria* R. & S. lies in the rather longer stems and the viviparous spikelets. Accordingly, I treat it as a variety of the latter.

E. acicularis R. Br. is included in the Fl. Br. Ind. vi. 628 on the evidence of a sheet from Rottler's herbarium now in Herb. Kew. There is no indication of precise locality ; the label attached reads " Herbarium Rottlerianum Penins. Indiae Orientalis. Presented by the Council of King's College, Feb. 1872." As the known distribution of the species is Europe, N. E. Asia and America, its occurrence in S. India is so improbable that, in the absence of corroboratory evidence, I have excluded it.

E. Gambleana Boeck. in Allg. Bot. Zeitschr. 1896, 54. The description omits any reference to hypogynous bristles and style-base, *i.e.*, the critical characters for generic distinction. I have seen two sheets of specimens collected by Mr. Gamble at Pykara in the Nilgiri Hills at 6000 ft. (No. 20548). One of these bears the inscription in Mr. Gamble's hand " Eleocharis Gamblei Boeck." It agrees with the locality noted in the description and with the description itself as far as it goes, and if not the type specimen is very probably a duplicate of it. These specimens are defective, only the 2 or 3 glumes and bracts being left. From one, however, just sufficient material—a ripe nut with bristles and style complete—was obtained to show that it is not an *Eleocharis* but is without doubt *Scirpus subcapitatus* Thw. Failing evidence to the contrary I propose treating *E. Gambleana* Boeck. as identical with *Scirpus subcapitatus* Thw.

Fimbristylis.

Page 1658. *F. subbulbosa* Boeck. (Cyp. nov. ii. 29). C. B. Clarke considers this species as probably identical with his *F. subtrabeculata*. Boeckeler refers to specimens of Mr. Gamble from Madras without quoting a number. On Gamble's sheet No. 20801 from Adyar

(Madras) in Herb. Kew., in his own hand, is written " Boeckeler named this F. sub-bulbosa." This sheet, however, undoubtedly is *F. polytrichoides* R. Br.

F. Kingii C. B. Cl. ex Boeck. and *F. trabeculata* C. B. Cl. After examining a number of specimens I am unable to separate them. The only specimen identified by C. B. Clarke as *F. trabeculata*, and apparently the type specimen, is *Gamble* 17330, now in Herb. Kew. It is rather smaller in all respects than the typical *F. Kingii*, and the glumes and the nut are rather paler in colour. The superficial cells of the nut are more distinctly transversely oblong, but I have seen nuts of *F. Kingii* in which the cells near the base are transversely oblong while those near the apex are hexagonal or nearly circular. These characters are not very constant. I did not find the nuts of *F. Kingii* subpapillose but distinctly, though minutely, warted. The description of *F. subtrabeculata* is silent on that point, but I find its nuts precisely the same. Boeckeler (Cyp. nov. ii. 40) correctly described the leaves of *F. Kingii* as " rigidulis hirsutis " a feature I find also in *F. subtrabeculata*, though C. B. Clarke does not mention it. I consider, therefore, that the two species are identical. *F. Kingii* is the earlier name.

F. aestivalis Vahl. Haines separates this species from *F. dichotoma* Vahl because the former is " hairy or pubescent all over " and the latter nearly glabrous. But Vahl and C. B. Clarke state that *F. dichotoma* is variable in this respect being sometimes even villous. Clarke (Fl. Br. Ind. vi. 635 and 637) distinguishes the two by the nut being distinctly striate and trabeculate in the first, while in the second it is smooth with the outer cells in less prominent vertical rows. I have seen equally prominently striate and trabeculate nuts in specimens marked by C. B. Clarke as *F. aestivalis* as in those he identified as *F. dichotoma*. I can trace no reliable distinction between the two species and retain only *F. dichotoma* (*Scirpus dichotomus* Linn.), thus maintaining the earlier trivial.

Page 1660. *F. tenera* R. & S. and *F. monticola* Steud. I cannot find any satisfactory characters to distinguish these two species. There are glands on the glumes of at least one specimen determined by C. B. Clarke as *F. monticola*. The width of the leaves and the colour and markings of the nut are variable in both sets of specimens. I have decided, therefore, to unite them under the former and earlier name.

F. Gambleana Boeck. in Cyp. nov. ii. 40. The description is lacking in all reference to the critical floral characters, style, nut, stamens, etc. I have seen no specimen that can be identified with the description. In the circumstances I exclude the species.

Bulbostylis.

Dr. Britton in " Sedges of Jamaica " has drawn attention to *Stenophyllus* Raf. as an earlier name for this genus, and this verdict has been accepted by T. Cooke in Fl. Pres. Bomb. ii. 886. It does not seem to me, however, that the very short description given by

Rafinesque agrees with *Bulbostylis*; therefore, I follow C. B. Clarke and others in retaining that name.

Scirpus.

Page 1666. *S. supinus* L. var. *uninodis* C. B. Cl. In Fl. Br. Ind. vi. 656, this variety is separated out because the spikelets are umbellate on 1–3 rays. As I have found both types of umbel on the same plant, I cannot maintain the variety.

S. Michelianus Linn. In Fl. Br. Ind. vi. 662 the distribution of this species is noted as "throughout British India." I have seen no specimens from S. India, nor are any cited by C. B. Clarke in his ms. monograph; I have, accordingly, excluded the species.

Fuirena.

Page 1669. *F. umbellata* Rottb. The inner bristles are usually described as sessile or nearly so, but in every *mature* spikelet examined by me well-developed claws are exhibited. The claw, however, is invariably horizontally and closely sigmoidally curved so that it is hardly perceptible until expanded under the lens.

Hypolytrum.

Page 1673. *H. Wightianum* Boeck. After a considerable study of the specimens so determined by C. B. Clarke and of the descriptions given by Boeckeler and by Clarke I have not been able to distinguish this species from *H. latifolium* L. C. Rich. Attempts have been made to differentiate them on the nuts, but these are very variable even in the same plant. The variations are probably due partly to the plants being polygamo-dioecious and partly to local conditions.

Scleria.

Page 1678. *S. poaeformis* Retz. Obs. iv. 13 (1786) has been altogether omitted from the Fl. Br. Ind. and from the Handbook of the Fl. Ceyl. (Trimen). In C. B. Clarke's ms. monograph of the Cyperaceae it is relegated to the insufficiently known "residue." Clearly neither C. B. Clarke nor Sir J. D. Hooker saw the type specimen collected by Koenig, now in the Herb. Lund. Having seen the type I consider that it is identical with *S. oryzoides* Presl (1828). The earlier name, *S. poaeformis* Retz., is to be maintained.

S. melanostoma Boeck. has been differentiated from *S. elata* Thw. on account of its unwinged midstem sheaths and dark nuts. I have, however, seen unwinged sheaths on stems bearing white nuts and winged sheaths correlated with nuts as dark as the typical ones of *melanostoma*. Moreover, white and dark nuts are found sometimes in the same panicle. Therefore, I unite the two under the name *S. cochinchinensis* Druce, which Druce has shown to be the correct name for *S. elata*.

Carex.

Page 1685. *C. Christii* Boeck. The evidence for the occurrence of this species on the Nilgiri Hills is open to some doubt. Boeckeler states that Christ found it on the Rigi in Switzerland. Kükenthal, in Pflanzenr. iv. 20. p. 97, states that this is a printer's error and

that the correct locality is the Nilgiri Hills of India. He does not give any evidence for the conclusion and cannot now remember how he came by it. He had not seen the sheet at the time of writing. As far as I am aware, Dr. H. Christ was never in India. Nevertheless in view of Dr. Kükenthal's statement, I have retained the species in the flora.

C. gemella Hochst. I have seen Hohenacker's specimen No. 942a at the British Museum and find it identical with *C. brunnea* Thunb. The apical spikelets have lost all their lower flowers (presumably ♀) and nuts so that it might appear that they had been entirely ♂. Even were the two apical spikelets entirely ♂ in the type sheet, which is in Paris (the one in the British Museum being a duplicate), I would consider it to be an abnormal form of *C. brunnea*, but M. Gagnepain has kindly examined the type and informs me that it too has lost all the lower flowers and there is nothing to show that they were not ♀.

XXXVIII.—THE LOOFAH INDUSTRY. F. N. Howes.

The loofah industry is one which, not unlike several other vegetable industries, is subject in a certain degree to the caprices of fashion. In the bath, loofahs have perhaps been supplanted to a some extent by the rubber article, but, nevertheless, they are still used in not inconsiderable quantities as bath-straps and flesh-gloves. In Great Britain the demand for the loofah sponge is said to be greatest in the mining and industrial areas, where its body cleansing powers are appreciated by the workers. Apart from the uses already outlined loofah fibre is at the present time employed in the manufacture of various other articles, one of the best known being the inner soles of footwear. For household cleaners and scrubbers of various types the fibre is eminently useful, possessing as it does certain properties which are rather unique among vegetable fibres. Other articles for which the loofah is or has been used are bath-mats, loofah cloth, loofah hats and spine-pads (Japan). Records exist of the fibre having been utilised for upholstery purposes, but for this use it does not appear to have been entirely suited or to have become generally adopted. A more recent application* for loofah fibre is in oil-filtration on steamships and in steam-mills, the fibre being used in place of coke.

The commercial supplies of loofah are obtained at the present time almost entirely from Japan, that country having always held a more or less unbroken monopoly for the product. Consignments from other countries, *e.g.* Florida and parts of Northern Africa, have appeared on European markets from time to time but never in large quantities. The superior or luxury grades of loofah, those of 16–18 ins. and upwards in length and of good colour and texture, are always of Japanese origin.

*Inlichtingen en Onderzoekingen van de Afdeeling Handelsmuseum, Koloniaal Instituut, Amsterdam, 1929, Med. xxvi. No. 8, p. 123.

The loofah plant grows readily in most warm countries and attempts have been made to establish production on a commercial scale in various other parts of the world, including Java and India, but so far with no very great success. In Java it was found* that plants grown from seed of two Japanese varieties grew vigorously in the early stages but the subsequent flowering and setting of fruit were disappointing. The cultural treatment given the plants was exactly the same as that adopted in Japan, and out of an estimated yield of 80,000 loofahs from the plot planted only 3000 pieces were actually harvested. These were of inferior length and colour. The conclusion arrived at was that successful loofah production cannot be carried out in a damp tropical climate, such as that obtaining in the part of Java (Tijpemeuh) where the experiment was carried out ; under these conditions the plant can merely be regarded as a useful quick-growing climber capable of supplying sufficient loofahs for local use. In India,† though careful attention was given to cultivation and preparation, the sponges produced were of poor quality, being small and brown, and the plants suffered from insect attack. The opinion held by a large firm of loofah importers in London is that the conditions prevailing in Japan are peculiarly favourable to loofah cultivation and that this may be connected with the volcanic nature of the soil on the island. It is possible, however, that the failure to produce a good marketable article in other countries where the plant appears outwardly to thrive may be due to one or more of the following causes :—

1. Neglect to limit the number of fruits allowed to ripen on each vine to a few only ; unless this is done gourds of good length are not obtained.
2. Faulty methods of preparing the loofahs and separating the fibrous skeleton from the rind.
3. Unsuitable soil conditions or inadequate attention to the need for heavy manuring.

Luffa cylindrica M. Roem. is the species to which belong the varieties cultivated in Japan for loofah production. Other species of *Luffa* yield a fibrous net-work rather similar to that of *L. cylindrica,* but it is not of such length, neither is it regarded as being so suitable for commercial purposes. The fruit of this species in the fresh state, when properly grown, is frequently over two feet in length. A specimen grown in one of the houses at Kew (now in Museum I) measures 4 ft. 11 ins. in length in the dry state.

The treatment given to the " Hetchima " or Luffa crop in Japan is as follows. Seed is sown approximately at the end of March, the plant being grown as an annual. As soon as the first two leaves have developed the young plants are planted out in ridges 3–4 feet apart with the same distances between the plants in the rows. In some cases the young plants are transplanted several times in the nursery before being finally planted out. Adequate support has to be

*Teysmannia iii. p. 120. †Indian Trade Jour. iv. 19, pp. 313-315.

provided for the plants to prevent the fruits coming in contact with the ground, and the whole area is covered with horizontal palings of wood or bamboo about 6 feet from the ground supported by strong wooden posts. As the plant commences to grow the young flexible stems are tied to the uprights to assist them in climbing. When high enough they are arranged between the wide meshes of the framework, where they continue to develop of their own accord. As the plants are developing many of the side branches are cut off to encourage the growth of the main stem. The first-formed flower buds are nipped off, so also are those that appear late or after the setting of those fruits it is desired should mature. The ripening of the fruits and harvesting takes place in the autumn after a growing period of approximately six months. It is important that the fruits should be harvested at the right stage of maturity. This is indicated by the fruits commencing to turn yellow at the base and apex. Such fruits are also lighter to the touch than the unripe ones, which contain a much larger quantity of moisture. If the fruits are not cut at this stage they begin to turn brown as the outer layers commence to undergo decay, and this causes the fibrous material within to become discoloured. In cutting, about two inches of the fruit-stalk is left attached to the fruit for convenience in handling.

The sponge or fibrous portion may be separated from the fruit in various ways. The usual procedure in Japan is to place the freshly cut fruits in running water for a period varying from five days to a fortnight. This has the effect of softening the outer portion, which is then easily removed by hand. The abundance of small streams and rivulets in Japan in the areas where the loofah is cultivated facilitates this process. On being placed in the stream an object of some sort is generally placed over the loofahs to keep them well immersed, and some sort of simple enclosure is erected to prevent them being washed down the stream. On removal of the rind the fibrous portion is well washed and rinsed with fresh water : the more thoroughly this is done the whiter is the fibre likely to be. In the washing process the seeds come out of their own accord or are removed by hand. In some cases the seeds are removed from the loofah after it has dried by thrashing on a stone. After washing the loofahs are hung up in the sun to dry and bleach, after which they are ready for sale and export.

Another method of preparation is to hang the freshly cut fruits in an airy, draughty shed for two or three days, after which the outer skin becomes soft and pliable. This stage of the preparation is assisted by cutting off the tip of the gourd at the lower end, leaving a small hole through which moisture may drip. The loofahs are then extracted from the fleshy rind by running the finger down the skin of the fruit on one side and splitting it open. They are then thrown into a washing vat of lime-water (5 lbs. of slaked lime to 50 gals. of water) and after being well stirred and rinsed in the lime-water are transferred to the drying shed. The lime-water is well shaken

from each loofah before drying. Care has to be exercised in drying, for if dried too rapidly the fibre is liable to become brittle, while if drying is unduly prolonged the formation of mould accompanied by deterioration may occur, though the lime-water treatment militates against this.

In addition to field cultivation in Japan, which is largely in the province of Enshu with Hamamatsu as a commercial centre, loofahs are grown round the edges of fields and around dwellings and store-houses. The crop thrives in a light fairly moist soil and extensive manuring is practised. Various manures are used including dung, fish-manures, straw ashes, rice-dust, and mixtures of oil seeds and phosphatic fertilizers. When grown on a field scale the average yield is said to be in the neighbourhood of 24,000 pieces per acre.*

The Japanese loofahs vary in size from 8 to 18 inches and upwards in length, and are exported in press-packed bales of 8 to 9 cubic feet. Grading for size and quality is carried out before baling. The following figures indicate the nature of the grades and the number of loofahs per bale in the respective grades.

8–10 ins.	about	5,000 per bale.
10–12	,,	4,500 ,,
12–14	,,	3,500 ,,
14–16	,,	2,500 ,,
16–18	,,	1,800 ,,
18 in. and upwards	about	1,200 per bale.

On Western markets the popular grades at the present time are stated in trade circles to be those between 12 and 16 inches, there being very little demand for the smaller sizes. Length is the primary factor in determining the market value of a loofah and a very rapid rise in price takes place as the length increases. Pieces of 14 to 16 inches generally command twice or three times the price of those under 12 inches, while those of 18 inches and over may be valued at four or five times as much. A good white colour and good texture are also important considerations, but are of secondary importance to length according to present-day standards.

According to van de Polder† a custom sometimes practised in Japan is to cut the stems of the loofah vines about 5 feet from the ground after all the fruits have been harvested. The top of each stem is then bent round into a receptacle into which the sap flows and is collected. As much as half a litre of sap may be obtained from one plant in this way. This is used by Japanese women for rubbing on the face, hands, and body, and is regarded as an excellent substance for softening the skin and for giving it a fine fresh appearance.

Varieties and forms of *Luffa cylindrica* are cultivated as garden plants or occur naturalised in most tropical countries. The fruits are frequently used as a vegetable in the young stages before the fibre develops. In India two varieties are said to be commonly

*Der Tropenpflanzer v. p. 197.
†Teysmannia i, p. 509.

recognised ; the fruits of one are edible and are used by the poorer classes either boiled or in curry, while those of the other are bitter and toxic. Except for its bitterness and slightly darker colour the toxic variety is claimed to be scarcely distinguishable from the edible. An investigation of the bitter variety by C. L. Bose,* as a result of cases of poisoning, led to the isolation of two toxic glucosides from the fruit. One of these was found to act as a severe emetic and the other as a brisk cathartic causing much irritation and giving rise to dysenteric symptoms. The edible varieties of loofah and varieties of allied genera are believed to owe their freedom from poisonous principles to cultivation.

The oil from the kernels of the seeds belongs to the semi-drying class, is liquid at the ordinary temperature, and has a mild agreeable taste with a brownish-green colour. It is stated that the oil-cake cannot be used as a feeding stuff on account of its bitterness and probable toxicity, but being rich in proteins and phosphates it would serve as a useful manure.†

XXXIX.—TROPICAL AFRICAN PLANTS : VIII.‡

Ricinodendron tomentellum *Hutch. et Bruce*, sp. nov. [Euphorbiaceae]; affinis *R. africano* Müll. Arg., sed foliis infra dense stellato-tomentellis, floribus majoribus, petalis liberis differt.

Arbor alta. *Folia* decidua, digitatim 5-foliolata ; foliola subsessilia, obovato-oblanceolata, sensim acuminata, basi cuneata, juniora 6·5–13·5 cm. longa, 2–4·5 cm. lata, matura 20–23 cm. longa, glanduloso-denticulata, membranacea, infra dense stellato-tomentella, supra plus minusve glabrescentia ; nervi laterales utrinsecus 15–21, infra prominuli. *Inflorescentia* non visa. *Flores* masculi breviter pedicellati. *Sepala* 5, ovata, 5 mm. longa, 2 mm. lata, extra ferrugineo-stellato-tomentella, intus glabra. *Petala* 5, libera, oblonga, basi sensim angustata, circiter 6 mm. longa, 2 mm. lata ; disci glandulae erectae, breviter oblongae. *Stamina* 8–10, filamentis 3·5 mm. longis basi dense pilosis ; antherae leviter exsertae. *Flores* feminei non visi.

Kenya Colony : Kwale, Mar., *R. M. Graham* 2346.

Dichapetalum keniense *Hutch. et Bruce*, sp. nov. [Chailletiaceae] ; affinis *D. fructuoso* Hiern, sed pedunculis 5 mm. longis vel minoribus, foliis minoribus differt.

Frutex scandens ; ramuli annotini parce pubescentes, lenticellati, ramulis junioribus brunneo-pubescentibus. *Folia* obovato-oblanceolata, sensim et late acuminata, apice minute mucronata, basi late cuneata, 3–6·5 cm. longa, 1·5–2·6 cm. lata, integra, tenuiter coriacea, supra glabra, infra glabra costa media prominenti basi leviter

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*Calcutta Med. Journ. Sept. 1906, pp. 65-74.
†Bull. Imp. Institute. No. 1, 1929, p. 109.
‡Continued from *K.B*, 1929, p. 28.

pubescenti excepta ; nervi laterales utrinsecus 5–7 ; petioli pubescentes, circiter 5 mm. longi ; stipulae caducae, lineares, pubescentes, 2 mm. longae. *Inflorescentiae* ad apices ramulorum, circiter 1·5 cm. longae ; pedunculi usque ad 5 mm. longi ; pedicelli circiter 5 mm. longi, griseo-pubescentes. *Alabastra* subglobosa. *Flores* albi, usque ad 5 mm. longi. *Sepala* 5, oblonga, extra griseo-tomentella, intus glabra, circiter 3 mm. longa, demum reflexa. *Petala* 5, ovata, glabra, profunde bifida, erecta vel leviter patentia. *Stamina* 5, leviter exserta, filamentis latis glabris ; antherae parvae, basi rotundatae. *Ovarium* globosum, lanato-tomentosum, stylo glabro, stigmatibus breviter bilobatis.

Kenya Colony : Malindi District ; Arabuko, in undergrowth of forest of *Brachylaena Hutchinsii* Hutch. or in bush, *R. M. Graham* 2132 (type), 2312.

Crotalaria (Simplicifoliae) unicaulis *Bullock*, sp. nov. [Papilionaceae] ; nulli arcte affinis.

Herba annua erecta, 20–30 cm. alta ; caulis simplex, solitarius. *Folia* simplicia, petiolata, anguste elliptica, apice acuta vel breviter acuminata, basi longe cuneata, 5–7 cm. longa, 2–2·5 cm. lata, superne primum pubescentia demum glabra, petiolis subalatis 1 cm. longis. *Flores* majusculi, lutei, in racemum terminalem pauciflorum laxum dispositi. *Calyx* in toto 12–13 mm. longus, lobis lanceolatis acutis 6 mm. longis. *Vexillum* elliptico-obovatum, apice acutum, 1·8–2·2 cm. longum, 1·2–1·4 cm. latum. *Alae* oblongae, 1·3–1·5 cm. longae, circiter 4 mm. latae. *Carina* circiter 2 cm. longa, dorso rotundata, apice acuta. *Ovarium* lineare, glabrum, marginibus pubescentibus, stylo elongato basi pubescente. *Legumen* non visum.

Northern Rhodesia : Mwinilunga District, 4000–5000 ft., in the bush, stem 8–12 in. high, growing "singly, not in clumps," flowers bright yellow, darker at the back of the petals, Nov. 1929, *Miss J. M. Marks* 10.

This striking plant is remarkable for its habit, large flowers and simple leaves. The lamina is decurrent to the base of the petiole, giving it the almost winged appearance noted in the description above.

Loranthus (Longicalyculati) acacietorum *Bullock*, sp. nov. [Loranthaceae] ; *L. Fischeri* Engl. affinis sed foliis majoribus, ramulis junioribus brevissime puberulis mox glabrescentibus, calyce sublongiore, corolla subbreviore differt.

Rami annotini glabri, teretes, circiter 4 mm. diametro, cortice cinereo ; ramuli hornotini subteretes, patentes, brevissime puberuli mox glabrescentes ; internodia 1–2 cm. longa. *Folia* alterna, late oblongo-elliptica usque suborbicularia, apice rotundata, basi in petiolum brevissimum puberulum attenuata, usque 4 cm. longa et 2·5 cm. lata, subglabra, ut videtur subcarnosa. *Flores* axillares 2 vel plures fasciculati ; pedicelli 1–2 mm. longi, bractea cupularis, subglabra vel glabra limbo subintegro. *Calyx* subtruncatus, cylindricus,

4–5 mm. longus, limbo ciliato. *Corolla* aurantiaca, usque 2–5 cm. longa, alabastro ad staminum insertionem ampliato, tubo 6 mm. longo usque ad medium vel ultra unilateraliter fisso ; lobi lineares, usque 2 cm. longi, spiraliter torti. *Stamina* et *pistillum* ut in *L. Fischeri* Engl. *Fructus* ignotus.

Tanganyika Territory : S. W. Pares ; Mwembe, alt. 900 m., an orange-flowered parasite on *Ximenia* and *Acacia* spp. in desert country, common in some places, Jan., *Greenway* 2065.

Aporrhiza nitida *Gilg* in Engl. Pflanzenw. Afr. iii. II. 280 (1921), in obs., nomen subnudum, hic ab *E. Milne-Redhead* descripta [Sapindaceae] ; ab *A. paniculata* Radlk. foliolis magis coriaceis et indumento ferrugineo recedit.

Frutex vel *arbor* parvula 6 m. alta. *Rami* puberuli vel glabrescentes, teretes, cortice brunneo vel cinereo, juniores puberuli. *Folia* paripinnata, 2–4-jugata ; petioli 4–6 cm. longi, puberuli vel tomentosi ; rhachides 3–15 cm. longi, ultra foliola terminalia prolati, puberuli vel tomentosi, supra planiusculi ; foliola subopposita, breviter petiolulata, petiolulis 3–8 mm. longis puberulis, plus minusve oblique oblongo-elliptica vel oblongo-obovata, apice late et obtuse acuminata, basi subcuneata in petiolulos decurrentia, 6–18 cm. longa, 2·5–7 cm. lata, coriacea, supra glabra vel nitida, subtus pilis setulosis praesertim ad nervos parce adspersa ; costa supra inconspicua, basin versus canalem angustam efformans, subtus valde prominens ; nervi laterales supra valde inconspicui, subtus valde prominentes, utrinque 10–12 ; foliola immatura pubescentiora. *Inflorescentia* paniculata, terminalis, 20–30 cm. longa, rhachi pedunculis pedicellisque ferrugineo-tomentosis ; alabastra globosa, tomentosa. *Flores* alii masculi alii hermaphroditi. *Calyx* 7 mm. diametro, utrinque tomentosus, lobis deltoideis 2 mm. longis et latis. *Petala* alba, late spatulata, basin versus in tubum constricta, 3 mm. longa, 2 mm. lata, tubo 0·4 mm. lato 1·5 mm. longo, extra parce villosa, intus dense villosa ; discus 5-lobatus, 4 mm. diametro, glaber. *Stamina* 7, intra discum inserta ; filamenta filiformia, 3·5–4·5 mm. longa, parcissime villosa ; antherae ovatae, 1 mm. longae, vix 1 mm. diametro, dorso affixae. *Ovarium* in floribus masculis abortivum, dense tomentosum, in floribus hermaphroditis conicum, compressum, 2 mm. latum, vix 2 mm. longum, dense tomentosum, biloculare ; stylus linearis, 1·5 mm. longus, 0·3 mm. latus, glaber, stigmatibus simplicibus. *Capsulae* immaturae biscutellares, breviter stipitatae, tomentosae, lateraliter compressae ; fructus maturus non visus.

Nyasaland : Blantyre, 1895, *Buchanan* in *Herb. Wood* 6992 (type of leaves and fruits).

Tanganyika Territory : Kyimbila District ; Kibila Gorge, Risokolo, 7 Oct. 1912, tree 8 m. high, leaves green glossy, flowers cream with green sepals faintly scented, native name *Ntenga*, *Stolz* 1593 ; Kibila, Kimomo, 13 Feb. 1913, tree 8 m. high, leaves yellowish green, glossy, fruits green, native name *Itenga*, *Stolz* 1880.

Belgian Congo: Katanga; without precise locality, 30 Aug. 1916; native name *Mulundu, Ringoet* 84; Katanga, without precise locality, small tree, near water, 11 Oct. 1916, *Ringoet* 103.

Northern Rhodesia: Solwezi District; R. Jiundu, west of Solwezi Boma, in evergreen vegetation by the river, small evergreen tree 6 m. high, leaves glossy, flowers creamy white, 14 Sept. 1930, *Milne-Redhead* 1119 (type of flowers).

Cussonia jatrophoides *Hutch. et Bruce*, sp. nov. [Araliaceae]; affinis *C. hamatae* Harms, sed foliis minoribus glabris, spicis minoribus gracilibus differt.

Arbor parva; ramuli glabri. *Folia* alterna, ad medium digitatim 3–5-lobata; petioli 3·5–8 cm. longi, sulcati, graciles, apice leviter pubescentes; lamina 5–8 cm. longa, 8–13 cm. lata, membranacea, supra glabra, palmatim 3–5-nervis, nervis infra basin versus pubescentibus, lobis late ovatis apice acuminatis margine serratis; stipulae fere intrapetiolares, subulatae, pectinatae, circiter 3 mm. longae. *Inflorescentia* spicata; spicae ad apices ramorum fasciculatae, circiter 12 cm. longae. *Flores* non visi. *Fructus* ellipsoideus, circiter 7 mm. longus, 5 mm. latus, brunneus, apice disco prominente.

Tanganyika Territory: Dodoma District; Chenene Hills, 1450 m., common small spreading tree of lower *Berlinia* zone, *Burtt* 996.

Lagynias pallidiflora *Bullock*, sp. nov. [Rubiaceae]; *L. lasianthae* (Sond.) Bullock affinis sed calyce minore corolla extra glabra tubo multo breviore, foliorum nervis lateralibus infra indistinctis differt.

Frutex vel *arbor* parva, glabra. *Folia* anguste elliptica usque anguste obovato-oblanceolata, apice late obtuse acuminata, basi cuneata, circiter 6 cm. longa et 2–2·3 cm. lata, petiolis 5–7 mm. longis, utrinque glabra, discoloria, nervis lateralibus inferne indistinctis. *Cymae* 3–6-florae, pedunculis 3–5 mm. longis, pedicellis usque 2 cm. longis. *Calyx* fere ad basin 5-lobus, lobis sub anthesin oblongo-spatulatis circiter 1 cm. longis et 2 mm. latis, statu fructifero latioribus. *Corolla* longe tubulosa; tubus 1 cm. longus, lobis lanceolatis apice filiformibus circiter 6·5 mm. longis.

Tanganyika Territory: Sigi, 25 Oct. 1910, *Zimmermann* 3219 (type): Kwantago R., Dec. 1907, *Zimmermann* 1021.

The generic name *Lagynias* was proposed by E. Meyer* in 1843 to accommodate a peculiar plant from near Durban which he named *L. discolor* E. Mey. He did not, however, publish a description and later authors included this plant in the genus *Vangueria* Juss. E. Meyer's name was resuscitated by Robyns† in his monograph of the Vanguerieae in 1928, when he transferred to it a second species, *L. dryadum* (S. Moore) Robyns from *Vangueria*. The latter is a native of South Tropical Africa. The large calyx

*E. Mey. in Drège Zwei Pflanzengeogr. Docum. 159, 197 (1843).

†Robyns in Bull. Jard. Bot. Brux. xi. 313 (1928).

lobes, which, with the corolla lobes, are abruptly reflexed when the flower is open, are very characteristic, and at once distinguish the genus from its close ally *Vangueria*.

It is likely that a fourth species exists in Kenya Colony. A specimen in the Kew Herbarium (*R. M. Graham* 1691) is allied to *L. pallidiflora*, but is described as a large climber, 4 in. in diameter at the base, and attaining 100 ft. or more in height.

Lagynias lasiantha (*Sond.*) *Bullock*, comb. nov.

Lagynias discolor E. Mey. in Drège Zwei Pflanzengeogr. Docum. 591 (1843), nomen; Robyns in Bull. Jard. Bot. Brux. xi. 313 (1928), descr.

Pachystigma lasianthum Sond. in Linnaea xxiii. 55 (1850).

Vangueria lasiantha (Sond.) Sond. in Harv. et Sond., Fl. Cap. iii. 14 (1864-5) l.c.

Vangueria venosa Sond. in Harv. et Sond. l.c., partim, quoad syn. *Lagynias discolor* E. Mey.

The necessity for making the above new combination arose when working out the affinity of *Lagynias pallidiflora* Bullock described above. In his monograph of the Vanguerieae, Dr. Robyns took up the "nomen nudum" *L. discolor* E. Mey., published in 1843, whereas the plant in question was described under the name *Pachystigma lasianthum* Sond. in 1850.

Tecomaria rupium *Bullock*, sp. nov. [Bignoniaceae]; affinis *T. shirensi* (Baker) K. Schum., a qua differt ramulis hornotinis tomentello-pubescentibus, foliis patentibus 7–9-foliolatis, foliolis lateralibus pro rata brevius acuminatis, foliolorum nervis subtus patule hispidulis, calycis tubo pro rata longiore, capsulis brevioribus, seminibus minoribus, eorum nucleis rhomboideo-obovatis, alis purpureo-striatis.

Frutex 2–3 m. altus, ramulis hornotinis tomentello-pubescentibus. *Folia* patentia, usque 15 cm. longa, plerumque 9-foliolata; petiolus 4–5 cm. longus, ut rhachis tomentello-puberulus; foliola lateralia elliptica vel oblongo-elliptica, 2·5–5 cm. longa, 1·5–2·5 cm. lata, apice acuta vel breviter acuminata, basi rotundata, petiolulis 2–5 mm. longis; foliolum terminale ovato-oblongum, lateralibus paullo majus. *Racemi* longe pedunculati, 12–20 cm. longi; pedicelli 1·5 cm. longi, pubescentes, basin versus bracteolas duas oppositas lineares 2·5 mm. longas gerentes. *Calyx* tubuloso-campanulatus, 1·5 cm. longus, praesertim infra medium pubescens, vix accrescens, subaequaliter 5-lobatus; lobi oblongo-ovati, breviter cuspidati, circiter 4 mm. longi. *Corolla* rubra; tubus 2·5 cm. longus, ore circiter 7 mm. diametro; lobi late ellipici vel suborbiculares, circiter 1 cm. longi et 7–9 mm. lati. *Filamenta* 2·7 cm. longa; antherae lanceolato-sagittatae, circiter 4·5 mm. longae, loculis triente superiore connatis inferne divergentibus. *Ovarium* oblongo-ovatum, circiter 3 mm. longum; stylus 3·5 cm. longus, ramis spatulatis 2·5 mm. longis. *Capsula* lineari-oblonga, 5–7 cm. longa, valvis acute carinatis navicularibus. *Semina* oblonga, 1·5–1·7 cm. longa,

7–8 mm. lata, eorum nucleis rhomboideo-obovatis circiter 5 mm. diametro ad hilum late cuneatis, alis membranaceis irregulariter crenato-lobulatis purpureo-striatis.

Tanganyika Territory: Dodoma Province; N. Mpwapwa, 5000 ft. alt., "a beautiful red-flowered shrub 6–8 ft. high growing on rocks and rocky places in mountain *Brachystegia* wood-grassland, common but scattered, 20 Aug. 1930, *Greenway* 2425 (type). Without exact locality, *Busse* 174.

Mimulopsis glandulosa (*Lindau*) *Bullock*, comb. nov. [Acanthaceae].

Epiclastopelma glandulosum Lindau in Engl., Bot. Jahrb. xxii. 114 (1895); et in Engl. et Prantl., Nat. Pflanzenfam. iv. 3B, 305 (1895).

Mimulopsis Thomsonii C. B. Clarke in Dyer, Fl. Trop. Afr. v. 55 (1899).

This new combination is rendered necessary on account of the necessity for retaining the oldest specific epithet on reducing the monotypic genus *Epiclastopelma* to *Mimulopsis*.

Leucas (Astrodon) pododiskos *Bullock*, sp. nov. [Labiatae]; *L. tomentosae* Gürke affinis sed floribus paucioribus calyce tomentoso nec villoso differt.

Frutex 1 m. altus; ramuli juniores molliter albo-tomentosi, apicem versus tantum foliosi. *Folia* oblonga usque oblongo-obovata, usque 1·3 cm. longa et 4–6 mm. lata, apice rotundata vel subtruncata, crenato-dentata, ceterum integra, basin versus angustata, subsessilia, utraque pagina sericeo-tomentosa, nervis supra impressis infra valde prominentibus. *Flores* in axillis subsolitarii, sessiles. *Calyx* sub anthesin 5 mm. longus, extra tomentosus, intus glaber; tubus infundibularis, 10-costatus, ore recto (nec obliquo); limbus aequaliter 10-dentatus. *Corolla* alba, 1 cm. longa, tubo limbum aequante. *Discus* obtuse subaequaliter 4-lobus, stipitatus, stipe 1·5 mm. longo. *Calyx fructifer* cum nuculis ignotus.

Tanganyika Territory: S. Pares; S. Same, 2700 ft. alt., in a brownish red soil, Feb. 1930, *Greenway* 2115.

A shrub 3 ft. high with white flowers and silvery foliage; with a Convolvulaceous plant it forms the dominant herbaceous vegetation unit of the *Acacia* desert. A somewhat anomalous species, having the habit of species of *Ballota*.

XL.—CONTRIBUTIONS TO THE FLORA OF SIAM.*

ADDITAMENTUM XXXI.

Hedyotis impedita *Craib* [Rubiaceae-Hedyotideae]; ab affini *H. subdivaricata* Drake ex Pitard caule haud glabro, receptaculo breviter pubescente, calycis segmentis conspicue pubescentibus distinguenda.

*Continued from *K.B.*, 1931, p. 221.

Herba annua ; caulis erectus, 12–35 cm. altus, superne ramosus, rarissime e basi furcatus, sicco viridis, ima basi purpurascens, 4-angulatus, praecipue ad angulos pilis subflaccidis instructus. *Folia* opposita, lanceolata, anguste lanceolata, oblongo-lanceolata, vel oblanceolata, apice acuta, basi cuneata vel in petiolum vix distinctum attenuata, 1–3·5 cm. longa, 2–6 mm. lata, rigide membranacea, sicco supra luteo-viridia, subtus pallide viridia, pagina utraque scaberula, costa supra conspicua vel parum impressa subtus prominente, nervis lateralibus utrinque circa 4 obscuris, margine parum recurva, setuloso-ciliata, petiolo brevi saepissime vix distincto suffulta ; stipulae breves, lobulatae vel fimbriatae, pubescentes. *Cymae* paniculam terminalem formantes, etiam in plantis minus robustis axillares, folia plus minusve subaequantes, et in plantis robustioribus ramulos axillares terminantes, paniculam efficientes, pedunculo communi circa 2 cm. longo incluso ad 5 cm. longae ; pedicelli usque ad 2 mm. longi, cum pedunculis breviter sparse pubescentes, bracteis parvis. *Receptaculum* 0·5 mm. longum, puberulum. *Calycis* segmenta 4, lanceolata vel late lanceolata, subacuta, receptaculo paulo longiora. *Corolla* alba (ex *Kerr*) ; tubus 2 mm. longus, intra superne pilosus ; lobi 4, oblongo-elliptici, obtusi, tubo subaequilongi, paululo ultra 1 mm. lati, intra inferne pilosi. *Stamina* 4, filamentis 1 mm. longis puberulis apicem versus corollae tubi insertis, antheris longius exsertis vix 1 mm. longis. *Stylus* 1·25 mm. longus, glaber, stigmatibus duobus papillosis stylo subaequilongis. *Fructus* puberulus, pallide viridis, 2 mm. longus, vix 2 mm. diametro, septicide dein loculicide dehiscens ; semina fusca, angulata, in placenta immersa.

Prachuap, Hua Hin, near sea-level, scrub, *Kerr* 13433.

Hedyotis lychnidifolia *Craib* [Rubiaceae-Hedyotideae] ; ab *H. tetrangulare* Walp. caule piloso, foliis magis divaricatis pro rata saepissime latioribus, ab *H. impedita* Craib receptaculo glabro, styli ramis pro rata multo brevioribus distinguenda.

Herba 45–70 cm. alta, annua ; caulis erectus, simplex, pilosus, angulatus, sicco pallide viridis vel interdum parum lutescens. *Folia* opposita, nodis inferioribus approximatis, internodiis superioribus 5–8 cm. longis, lanceolata vel oblongo-lanceolata, vel suprema linearia, apice subacuta, basi cuneata, 0·7–3 cm. longa, usque ad 6 mm. lata, chartacea, sicco viridia vel parum lutescentia, subtus pallidiora, pagina utraque pilosa, costa supra impressa subtus prominente, nervis lateralibus utrinque 3–4 inferioribus fere e basi ortis subconspicuis vel fere obscuris, sessilia vel petiolo vix distincto brevi suffulta ; stipulae variabiles, lineares vel deltoideo-lanceolatae, obtusae, acutae, vel longius attenuatae, saepe recurvae, 3–5 mm. longae. *Cymae* paniculam terminalem 6–8 cm. longam 3–9 cm. latam efficientes ; flores albi (ex *Kerr*), pedicellis 0·25–1 mm. longis suffulti ; bracteae lanceolatae, pedicellis subaequilongae vel iis paulo breviores. *Receptaculum* circa 1 mm. longum, glabrum. *Calycis* tubus brevis, segmenta 4, lanceolata, subacuta, 2 mm. longa,

basi vix 1 mm. lata, glabra, viridia, sat rigida, dorso medio carinata, apice parum recurva. *Corollae* tubus 3·25 mm. longus, intra superne pilosus, lobi 4, oblongo-lanceolati, obtusi, 2·25 mm. longi, 1·5 mm. lati, dorso pilis paucis brevibus instructi, intra basi pilosi. *Stamina* 4, filamentis ad corollae tubi apicem affixis 1 mm. longis glabris, antheris exsertis anguste oblongis filamentis subaequilongis. *Stylus* glaber, stigmatibus duobus circa 0·75 mm. longis inclusis 2 mm. longus. *Capsula* ellipsoidea vel ellipsoideo-globosa, ad 2 mm. longa, viridis, glabra, calyce persistente coronata, septicide dein loculicide dehiscens; semina parva, angulata, in placenta immersa.

Kanchanadit, 5 m., common in savannah, *Kerr* 13066.

Hedyotis Pitardiana *Craib* [Rubiaceae-Hedyotideae]; ab affini *H. dimorpha* Craib calycis segmentis sub anthesin recurvis, pedicellis multo longioribus recedit.

Ramuli volubiles, primo densius pilosi, mox pilosi, cortice brunneo-rubro obtecti, fistulosi. *Folia* opposita, lanceolata vel oblongo-lanceolata, apice acute subacuminata, basi late cuneata vel rotundato-cuneata, 3–6·5 cm. longa, 0·8–2 cm. lata, rigide chartacea, sicco supra viridia, subtus pallide viridia, supra fulvo-pilosa, subtus densius pallide pilosa, costa supra conspicua subtus prominente, nervis lateralibus utrinque 3–5 obliquis supra parum impressis subtus subprominentibus, petiolo brevi densius piloso suffulta; stipulae 4-fidae, demum reflexae, ad 5 mm. longae. *Umbellae* terminales, per tres dispositae, pedunculo communi circa 7 mm. longo indumento ei ramulorum simili tecto suffultae; pedicelli saltem 2 mm. longi, pubescentes; flores luteo-albi (ex *Kerr*). *Receptaculum* 1 mm. longum, pubescens. *Calycis* dorso pubescentis tubus receptaculo paulo brevior, lobi 4, lanceolati, acuti, sub anthesin recurvi, 2 mm. longi, 1 mm. lati, intra pubescentes. *Corollae* tubus 2 mm. longus, utrinque glaber, lobi 4, lanceolato-lineares, 4·75 mm. longi, 1 mm. lati, dorso sparse hirsuti, intra inferne dense pilosi. *Stamina* 4, filamentis ad corollae tubi apicem affixis 1·5 mm. longis intra dense pilosis, antheris paulo ultra 1 mm. longis. *Discus* pilis brevibus erectis dense coronatus. *Stylus* fere 6 mm. longus, pilis albis oblique erectis hirsutus; stigmata duo, circa 1·25 mm. longa.

Kaw Chang, Klawng Mayom, near sea-level, scrub by stream, *Kerr* 6870.

Hedyotis punicea *Craib* [Rubiaceae-Hedyotideae]; ab affini *H. tetrangulare* Walp. foliis calycisque segmentis brevioribus, receptaculo conspicue puberulo inter alia distinguenda.

Herba annua, caule erecto 8–23 cm. alto simplice vel apice tantum ramoso tetrangulare glabro vel iuventute parcius breviter hirsuto sicco viridi. *Folia* opposita, oblique erecta, inferiora saepe ovata, superiora saepissime oblongo-oblanceolata vel spatulata, apice obtusa, basi cuneata vel rotundato-cuneata, 5–12 mm. longa, 2–4·5 mm. lata, rigide chartacea, sicco viridia vel parum lutescentia, glabra, costa supra parum impressa subtus prominente, nervis

lateralibus utrinque circa 3 obscuris inferioribus saepissime conspicue obliquis, sessilia ; stipulae persistentes, foliis similes sed interdum pauci-lobulatae et multo minores, saepissime circa 2 mm. longae. *Cymae* caulem terminantes vel saepissime etiam ramulos breves ex axillis superioribus oreuntes terminantes, dichasia mox divaricata usque ad 2 cm. longa et 5 cm. diametro formantes ; pedicelli sub anthesin 1–1·5 mm. longi ; bracteae pedicellis subaequilongae vel iis paulo longiores. *Receptaculum* circa 0·5 mm. longum, conspicue longius puberulum vel brevius pubescens. *Calycis* segmenta 4, ovato-lanceolata, subacuta, 1 mm. longa, 0·5 mm. lata, dorso medio subcarinata, glabra. *Corolla* pallide punicea (ex *Kerr*), extra superne breviter pubescens ; tubus 2·5 mm. longus, intra superne pilosus ; lobi circa 2 mm. longi. *Antherae* 4, circa 0·5 mm. longae, subsessiles, inclusae, fere ad corollae tubi medium affixae. *Stylus* gracilis, 3·5 mm. longus, glaber, stigmatibus linearibus circa 0·5 mm. longis. *Fructus* mox plus minusve glabrescens, circa 2·25 mm. diametro, septicide dein loculicide dehiscens.

Nakawn Panom, Ta Uten, 200 m., open grassy ground, *Kerr* 8456.

Hedyotis Ridleyana *Craib* [Rubiaceae-Hedyotideae] ; ab affini *H. capitellata* Wall. ex G. Don receptaculo cum calyce haud glabro recedit.

Ramuli volubiles (ex *Kerr*), primo prope nodos praecipue in sulcis pubescentes, mox glabri, sicco virides vel olivacei, ad 1·5 mm. diametro. *Folia* lanceolata, late lanceolata, vel oblongo-oblanceolata, apice acute attenuato-subacuminata, basi cuneata, 5–10 cm. longa, 1·3–2·8 cm. lata, chartacea, sicco supra viridia, subtus pallide viridia, pagina utraque breviter subsparse setulosa, nervis lateralibus utrinque 4–5 obliquis cum costa supra impressis subtus prominentibus, nervulis subobscuris, petiolo usque ad 5 mm. longo suffulta ; stipulae ad 4 mm. longae, pauci-fimbriatae et pinnatim lobulatae, fimbriis et lobulis glanduloso-terminatis. *Capitula* per 3 vel 5 disposita, axillaria vel terminalia, pedunculo ad 1·5 cm. longo subhirsuto suffulta, sub anthesin ad 1·4 cm. diametro, densiflora ; flores sessiles vel pedicello ad 0·75 mm. longo suffulti, dimorphi. *Receptaculum* ad 1 mm. longum, parce pilosum. *Calycis* dorso parce pilosi tubus circa 0·5 mm. longus, lobi 4, sub anthesin recurvi, lanceolati, acuti, vix 2 mm. longi, 0·75 mm. lati. *Corollae* tubus ad 1·5 mm. longus, glaber, lobi 4, lineares, 4 mm. longi, circa 0·8 mm. lati, dorso glabri, intra medio inferne dense pilosi. *Stamina* 4, filamentis ad corollae tubi apicem affixis 2 mm. vel 3·5 mm. longis superne glabris intra basem versus dense pilosis, antheris paululo ultra 1 mm. longis. *Discus* glaber. *Stylus* 2 mm. vel 4·5 mm. longus, glaber ; stigmata duo, mox recurva, papillosa.

Ranawng, La-un, 50 m., bamboo forest, *Kerr* 16458.

Hedyotis sarmentosa *Craib* [Rubiaceae-Hedyotideae] ; ab affini *H. venosa* Korth. ramulis gracilibus, foliis angustis minoribus, floribus paucioribus inter alia recedit.

Fruticulus sarmentosus, ramulis fistulosis ad 2·5 mm. diametro cortice cinereo-brunneo obtectis, lenticellis haud conspicuis, novellis pilis albis nitidis brevibus dense tectis. *Folia* lanceolata, apice longius angustata, summo apice costa excurrente apiculata, basi attenuato-cuneata, 2·5–4 cm. longa, 0·5–0·8 cm. lata, sat rigida, sicco supra viridia, subtus pallide viridia, pagina superiore pilis brevibus crassis rigidis et inferiore ad costam nervosque laterales pilis similibus scabridula, nervis lateralibus utrinque 5–7 obliquis supra subobscuris vel parum impressis subtus prominulis, nervulis obscuris, margine recurva, petiolo circa 3–5 mm. longo indumento ei ramulorum simili instructo supra canaliculato suffulta ; stipulae ad 4 mm. longae, in segmenta subulata 3–5 puberula divisae. *Glomeruli* axillares. *Receptaculum* breve, puberulum. *Calyx* in segmenta 4 linearia 1·75 mm. longa puberula ciliata fere ad basem divisus, dentibus parvis inter segmenta additis. *Fructus* indehiscens, subglobosus, puberulus, calyce persistente coronatus, seminibus loculo quoque 3–4 brunneis angulatis foveolatis.

Nan, Doi Pu Ka, 1500–1600 m., common in evergreen forest, *Kerr* 4941.

Chasalia chartacea *Craib* [Rubiaceae-Psychotrieae] ; a *C. ophioxyloide* (Wall.) foliis pro longitudine angustioribus, inflorescentia breviore, filamentis longioribus recedit.

Frutex circa 1·5 m. altus (ex *Kerr*) ; ramuli primo parce puberuli, cito glabri, iuniores sicco fusci, mox substraminei, teretes, ad 3 mm. diametro. *Folia* oblonga, oblongo-lanceolata, vel oblongo-oblanceolata, obtuse acuminata, basi cuneata, interdum parum inaequilateralia, latere altero dimidiatim cuneata, altero dimidiatim acuminata, 9–17 cm. longa, 3–5·5 cm. lata, chartacea, sicco iuniora fusca, matura viridia, subtus pallidiora, glabra, costa supra conspicua subtus prominente, nervis lateralibus utrinque 8 intra marginem anastomosantibus supra conspicuis vel subprominulis subtus prominulis, nervis transversis paucis supra conspicuis subtus subprominulis, integra, petiolo 0·5–2 cm. longo glabro supra canaliculato suffulta ; stipulae circa 3 mm. longae, saepissime bilobatae, mox deciduae. *Inflorescentia* terminalis, pedunculo communi ad 1·8 cm. longo incluso 4 cm. longa, 4 cm. diametro, pedunculis partialibus utrinque 2 inferioribus 8 mm. longis, interdum etiam inflorescentia multo minore ex axillis supremis orta, pedunculis puberulis ; flores albi, luteo-oculati (ex *Kerr*), sessiles vel interdum pedicello brevi suffulti. *Receptaculum* circa 1 mm. longum. *Calyx* vix 0·5 mm. longus, truncatus vel irregulariter lobulatus. *Corollae* tubus circa 1·3 cm. longus, extra glaber, intra ad filamentorum insertionem pauci-pilosus, lobi 5, circa 2 mm. longi et 1·25 mm. lati. *Stamina* 5 ; filamenta 2·5 mm. longa, circa 1 cm. supra corollae tubi basem inserta ; antherae lineares, 2 mm. longae, parum exsertae. *Discus* carnosus, calyce paululo longior. *Ovarium* biloculare, ovulis solitariis erectis. *Fructus* fuscus, glaber, 6 mm. diametro.

Yanyao, 50 m., evergreen forest, *Kerr* 18175.

Chasalia membranacea *Craib* [Rubiaceae-Psychotrieae]; a *C. ophioxyloide* (Wall.) foliis membranaceis recedit.

Frutex circa 0·75 m. altus (ex *Kerr*), glaber; ramuli teretes, sicco fusco-virides, ad 2·5 mm. diametro. *Folia* lanceolata, oblongo-lanceolata, vel late oblanceolata, apice obtuse subacuminata, basi cuneata vel subacuminata, 10–18 cm. longa, 2·5–4·5 cm. lata, membranacea, sicco supra fusco-viridia, subtus pallide viridia, nervis lateralibus utrinque 8 supra conspicuis subtus subprominentibus intra marginem anastomosantibus, nervulis paucis inter se distantibus pagina utraque subconspicuis, margine integra, petiolo subgracili 7–15 mm. longo suffulta; stipulae oblatae, breves, parte basali diu persistente. *Inflorescentia* terminalis, pedunculo communi 1–2 cm. longo incluso 3–4 cm. longa, pedunculis partialibus circa 5 mm. longis pro genere paucifloris, floribus albis (ex *Kerr*) sessilibus. *Receptaculum* 1·5 mm. longum. *Calyx* circa 0·5 mm. longus, apice denticulatus. *Corollae* tubus 1·8 cm. longus, glaber, lobi 5, oblongi, apice rotundati vel obtusi, ad 5 mm. longi et 2·25 mm. lati, glabri. *Stamina* bene inclusa, filamentis 1·5 mm. longis 7 mm. supra corollae tubi basem affixis, antheris linearibus 3·25 mm. longis. *Discus* calyce conspicue longior, carnosus. *Ovarium* biloculare, ovulis solitariis erectis.

Nakawn Sritamarat, Kao Luang, 1100 m., evergreen forest, *Kerr* 15475.

Chasalia microphylla *Craib* [Rubiaceae-Psychotrieae]; a speciebus aliis foliis parvis distinguenda.

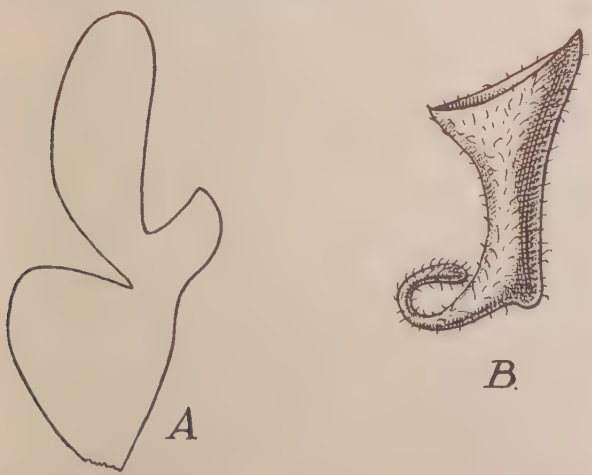
Frutex circa 1·5 m. altus; ramuli graciles, usque ad 2 mm. diametro, ob stipulas persistentes conspicue nodosi, glabri, iuventute sicco fusci, demum cinerei. *Folia* oblanceolata lanceolatave, apice acuminata, acuta, basi cuneata, usque ad 6 cm. longa et 1·6 cm. lata, sicca supra plus minusve fuscescentia, subtus pallide viridia, glabra, nervis lateralibus utrinque 5–7 intra marginem anastomosantibus pagina utraque subprominentibus, margine integra, petiolo 4–7 mm. longo supra canaliculato suffulta; stipulae circa 2 mm. longae, apice bifidae, cito stramineae, parte inferiore saltem diu persistente incrassata. *Inflorescentia* terminalis, pedunculo communi 5 mm. longo suffulta, foliis brevior, cymosim trifurcata, pedunculis partialibus circa 3 mm. longis glabris vel parce puberulis cymulam trifloram gerentibus, floribus albis (ex *Kerr*) sessilibus vel pedicello fere 2 mm. longo suffultis. *Receptaculum* 1·5 mm. longum, glabrum. *Calycis* tubus 0·5 mm. longus, lobi 5, deltoidei, acuti, fere 1 mm. longi, glabri. *Corollae* tubus inferne parum curvatus, 9 mm. longus, extra glaber, intra supra staminum insertionem pauci-pilosus, lobi 5, suboblongi vel lanceolato-oblongi, obtusi, ad 3·5 mm. longi et 1·75 mm. lati. *Antherae* parum exsertae, lineares, 2·5 mm. longae, filamentis 3 mm. longis 6 mm. supra corollae tubi basem insertis. *Discus* carnosus, calycis tubo paululo longior. *Stylus* 8 mm. longus, lobis duobus 2·5 mm. longis; ovarii loculi 2, ovulis solitariis erectis.

Nakawn Sritamarat, Kao Luang, 1600 m., evergreen forest, *Kerr* 15520.

XLI.—PLANTS NEW TO ASSAM : III.*

Impatiens cothurnoides *C. E. C. Fischer* sp. nov. [Balsaminaceae] ; ab *I. Wattii* Hook. f. foliis oppositis, sepalis 2, pedunculis pedicellis floribusque hirsutis differt.

A *herb* about 2 ft. high. *Stem* stout, almost woody, branched, brown, sulcate, glabrous below, brown-furfuraceous at the ends of the branchlets, as are the peduncles, pedicels and bracts. *Leaves* opposite and ternate, membranous, linear-elliptic, tapering to a subacute apex, base decurrent on the petiole, sparsely hairy on the midrib and nerves on both faces, midrib prominent below, primary nerves 9–10 pairs ascending at a narrow angle, margins regularly denticulate ; petioles very short. *Peduncles* axillary, solitary, slender, 0·2–1·4 cm. long, bearing an umbel of 2–4 primrose-yellow flowers at the apex ; pedicels slender, 0·5–1 cm. long ; bracts at the base of the pedicels lanceolate, acute, 3 mm. long. *Buds* excluding the spur sub-globose, hairy. *Sepals* 2, falcate-lanceolate, acute, 5 mm. long, green, sparsely furfuraceous-puberulous. *Standard* suborbicular, concave, 8 mm. in diameter, dorsally shortly hairy. *Wings* about 2 cm. long, 2-lobed ; distal lobe oblong, rounded, 1·2 cm. long, 4·5 mm. wide, with a well-developed, cuneate, rounded auricle 3–4 mm. long ; basal lobe rounded, 8–9 mm. long. *Lip* 1·2 cm. long excluding the spur, shaped like a cavalier riding-boot with mediaeval toe, mouth oblique, acute, shortly saccate at the posterior base, the anterior extremity produced into an upwardly recurved blunt spur nearly 1 cm. long, shortly furfuraceous-hairy, the hairs longer near the apex of the spur. *Capsule* linear-fusiform or slightly clavate, acute, about 1 cm. long, glabrous. *Seeds* pyriform, strongly curved, 1 mm. long, rugulose, papillose.



Impatiens cothurnoides C. E. C. Fischer. A, wing × 3⅓. B, lip × 3⅓.

*Continued from *K.B.* 1930, p. 241.

Garo Hills, Gauchi, 1000 ft. ; flowers and fruit Nov., *Mrs. N. E. Parry* 873, " Growing on river banks." Garo name, *Mirimbok* ; Lushai name, *Hmehzial* ; Lakher name, *Radong*.

Sterculia euosma *W. W. Smith* [Sterculiaceae].

Known from Yunnan.

Mishmi, Delei Valley, 2000 ft., flowers March, *Kingdon Ward* 7992. Agrees well with the typical plant, but the leaves are a little longer (up to 28 cm. long, 14 cm. wide, petiole 8 cm.) and the flowers are stated to be coral- or brick-red and inodorous.

Scaphium Wallichii *Schott & Endl.* [Sterculiaceae].

Reported from Tenasserim and the Malay Peninsula.

S. Lushai Hills ; a single fallen fruit found by *Rev. W. J. L. Wenger*. The Lushais say they know the tree, which occurs in the forest. The fruit is unmistakable, and it is highly improbable that it could be found otherwise than naturally in such a locality.

Elaeocarpus dubius *A.DC.* [Elaeocarpaceae].

Described from Indo-China.

Mishmi, Delei Valley, 3000-4000 ft., flowers April, *Kingdon Ward* 8125, " Small tree growing on a precipitous well-wooded slope in a jungle-filled ravine. Glands of disc orange."

Allophylus longipes *Radlk.* [Sapindaceae].

Hitherto known only from Yunnan.

Garo Hills ; Tura mountain, 4000 ft., fruit Nov., *Mrs. N. E. Parry* 854. Garo name, *Masugingsep*. The thyrses are hardly compound, but otherwise precisely as in Yunnan specimens in Herb. Kew.—probably a reduced form or a variety.

Buchanania acuminata *Turcz.* [Anacardiaceae].

Known from Burma, Siam and the Malay Peninsula.

S. Lushai Hills, 2500-2700 ft., flowers March, fruit July, *W. J. L. Wenger* 301, " In forest, a large spreading tree rather resembling the Mango tree ; densely flowered."

Swintonia floribunda *Griff.* [Anacardiaceae].

From Islands off Mergui.

Chittagong Hill Tracts, *King's Collector* 254 ; S. Lushai Hills, a single fallen fruit picked up by *Rev. W. J. L. Wenger*.

Chasalia lushaiensis *C. E. C. Fischer* comb. nov. [Rubiaceae].

This species was published in *K.B.* 1928, p. 141. It was, however, wrongly attributed to the genus *Gaertnera* and is actually in close affinity with *Chasalia curviflora* Thw.

In the Flora of British India, iii. 176, the following nos. of the Wallich Catalogue are quoted under the last-named species : 6164, 8360, 8361, 8363, 8364, 8375, 8386, 8390 and 8461. These appear to comprise more than one species and a revision of the genus is desirable.

The specimen now under consideration (*Parry* 180 from the Lushai Hills) differs from all these, more particularly in the shape and venation of the leaves, the narrowed cyme and the bracts. Nor is it *Psychotria lurida* Bl. The species should, therefore, be transferred to the genus *Chasalia* as *Chasalia lushaiensis*.

Jasminum Wengeri *C. E. C. Fischer* sp. nov. [Oleaceae]; *J. decussato* Wall. affine, inflorescentia compacta, lobis calycinis haud revolutis, corolla multo longiore lobis tubo multo brevioribus differt.

Shrub (climbing?). *Branchlets* terete, patently brown-hairy. *Leaves* simple, ovate to ovate-lanceolate, apex attenuate, acute, base rounded or emarginate, 3·5–6·5 cm. long, 1·8–3·5 cm. wide (only those near the ends of the branchlets seen), brown-hairy on both surfaces, more densely so on the ribs and nerves, ribs 3–5 subpalmate from the base, with 2–3 pairs of nerves from the midrib, arching and anastomosing, margins more or less undulate, brown-ciliate; petioles 4–7 mm. long, shaggy with brown hairs. *Cymes* terminal and from the upper axils, trichotomous, compact, shorter than the leaves; peduncle short, densely brown-hairy. *Calyx* 5–6 mm. long, longer than the shaggy pedicels, greenish-tawny-tomentose (when dry), lobes 5, linear, subacute, nearly as long as the tube, erect or nearly so, sinus narrow. *Corolla*-tube slender, 1·5–2·8 cm. long, slightly widening upwards, glabrous; lobes usually 6, narrowly elliptic, acute, 6–8 mm. long, glabrous. *Stamens* a little below the throat of the corolla, 1·7 mm. long; anthers apiculate. *Fruit* not seen.

S. Lushai Hills, 3500 ft., flowers August 1927, *Rev. W. J. L. Wenger* without number (Herb. Kew. and Herb. Calc.).

Gelsemium elegans *Benth.* [Loganiaceae].

Known from China, Upper Burma, Indo-China and Malay Islands.

Manipur, Barak, 9000 ft., flowers Nov., *C. B. Clarke* 42252A; Assam, without precise locality, *King's Collector* without number; S. Lushai Hills, Tuizenhnar, 4000 ft., flowers Oct., *Mrs. N. E. Parry* 322. Lushai name, *Hnamtur*.

Pedicularis corymbosa *Prain* [Scrophulariaceae].

Discovered in Upper Burma.

Lushai Hills, Champhai, 5000 ft., flowers Oct., *Mrs. N. E. Parry* 340, " Flowers pale-mauve turning to purple."

Mantisia Wengeri *C. E. C. Fischer* sp. nov. [Zingiberaceae]; *M. saltatoriae* Sims affinis, scapo breviore, bracteis bracteolisque luteis suborbicularibus glanduloso-punctatis, rhacheos ramulis fere a basi flores dissitos omnino luteos ferentibus, calyce glanduloso-punctato differt.

Herb; rhizome short; roots numerous, sometimes somewhat tuberous, up to 10 cm. long; rootlets wiry, much branched. *Stem*

succulent, up to 1 m. high, completely enclosed in the overlapping leaf-sheaths. *Leaves* alternate, bifarious, the lowest 3 or 4 reduced to sheaths, the basal very short, the others lengthening upwards, the next 1 or 2 bearing short ovate or elliptic acute blades ; blade narrowly lanceolate, finely caudate-acuminate, base narrow, sometimes unequal, sessile, 8–20 cm. long, 2–3·5 cm. wide, midrib slightly raised below, nerves parallel arising at a very acute angle from the midrib and meeting an intramarginal vein very close to the very narrowly cartilaginous, slightly undulate margin, primary nerves about 7 on either side in a cross section, face glabrous or with a few scattered, short, whitish hairs on the nerves above, both sides densely and minutely white-dotted (glands ?) ; sheaths of normal leaves about as long as the blades, open down one side, the exposed portion ribbed and minutely sparsely puberulous, margins scarious ; ligule 4–5 mm. long, bifid with a wide sinus, minutely ciliate. *Scapes* appearing before the leaves, radical, 1·5–3 cm. long, clothed in imbricating membranous, orbicular, gland-dotted, minutely ciliate scales 0·6–1·5 cm. long, increasing in size from the base upwards, lower strongly veined and densely puberulous, uppermost with indistinct veins and nearly glabrous, apex rounded or with a short triangular cusp. *Panicles* erect or decumbent with erect branches, 5–16 cm. long. *Rhachis* glabrous or minutely sparsely puberulous, branches bearing flowers from near the base. *Bracts* at the forks very thin, suborbicular, yellowish-green, more or less gland-dotted, 1–1·3 cm. long, glabrous or minutely puberulous. *Bracteoles* similar, 5–8 mm. long, sparsely and minutely brown gland-dotted. *Calyx* narrowly funnel-shaped, greenish-yellow, 7–8 mm. long, teeth 5, blunt, shallow, glabrous, minutely gland-dotted. *Corolla* yellow ; tube very slender, straight or curved, slightly enlarged at the mouth, more than twice the length of the calyx, white-puberulous ; limb 3-partite, upper segment erect, compressed boat-shaped, apex rounded, 5 mm. long, embracing the base of the filament, 2 lower divaricate, broadly triangular, rounded or acute, 4·5 mm. long. *Lip* narrowly cuneate, 1·3–1·5 cm. long, more or less deeply bifid, lobes rounded. *Stamen* yellow, about 1·6 cm. long, filament slender, bearing two very narrowly linear, finely acuminate staminodes 0·8–1·3 cm. long just above the apex of the upper corolla segment ; anther with a short oblong wing on either side. *Ovary* oblong, 4·5 mm. long. *Fruit* subglobose, pericarp papery ; seeds numerous, oblong, slightly compressed, acute, glabrous, brown, 1·5 mm. long.

S. Lushai Hills, 3500–4000 ft., flowers April—May, fruit May, *W. J. L. Wenger* 306.

This species appears to be intermediate between *M. saltatoria* Sims and *M. spathulata* Schult. It differs from the latter in the smaller leaves with much shorter ligule, the much less pubescent rhachis of the panicle, the much longer linear instead of spathulate staminodes and the yellow suborbicular bracts and bracteoles. It would not be surprising to find that it is a hybrid between the two ;

in general appearance it resembles *M. spathulata* more than the more elongate *M. saltatoria*. *M. spathulata* is sometimes very pale but the bracts and bracteoles are apparently always somewhat purple. The present species was found in association with *M. saltatoria* on rock-faces in the shade near streams.

XLII.—MISCELLANEOUS NOTES.

Eucalyptus patellaris.—In a collection of plants made by Mr. C. E. F. Allen in North Australia specimens of a very unfamiliar Eucalypt were included which have been determined as *Eucalyptus patellaris* F. Muell. Mueller collected specimens of this species on the Upper Roper River in North Australia on 3rd July, 1856, when he was with Gregory's North-West Expedition. The species was described from these specimens, the original description being in the Journal of the Linnean Society, iii. 84 (1859). Commenting on the plant J. H. Maiden (Critical Revision Genus Eucalyptus, iv. 257, 1920) states: "The only specimen which appears to have been preserved and which is at Kew. . . .". It may be pointed out that the general collections made by Mueller in North Australia are better represented at Kew than in the Melbourne Herbarium, and Bentham in the introduction to the Flora Australiensis states that Mueller at that time preferred to send his rare specimens to Kew rather than to retain them in the Herbarium under his charge.

The specimens at Kew consist of two small sterile branchlets, a detached flower and a detached capsule. The flower, capsule and parts of the branchlets are figured by Maiden in Plate 163, vol. iv. of his Critical Revision.

Mr. Allen collected his specimens at Mataranka Station in August, 1922, and he remarks that it is "a bloodwood, a large tree." As the original specimens are so fragmentary, a few notes on Mr. Allen's specimens No. 683 are appended.

The fragments of the outer dead bark are hard, wavy-grained, dark brown internally and light grey externally. The leaves attain 22 cm. in length and 2 cm. in breadth. The inflorescences have evidently been in panicles 5–10 cm. long; the angular pedicels of the capsules are 6–8 mm. long; the almost bell-shaped capsules are 8–10 mm. long and about 8 mm. in diameter at the apex; the rim of the capsule attains 2 mm. in thickness and the 4 protruding valves are conspicuous. W. D. FRANCIS.

The habitat of Patersonia macrantha.—The collection of a species of *Patersonia* in Arnhem Land, North Australia, by Dr. Herbert Basedow, raises some important questions concerning the distribution of this genus in Australia. *Patersonia*, which belongs to the family Iridaceae, is limited to Australia and the islands to the north of it. The species of the genus are conspicuous plants in the landscape of the regions where they grow on account of their large,

bibracteate inflorescences and delicate, evanescent corollas, which are often coloured blue.

Dr. Basedow's specimens, no. 140, so closely resemble *Patersonia macrantha* Benth. (Fl. Austral. vi. 407, 1873) that they are specifically scarcely separable from it. They differ from the type, however, in possessing a denser indumentum on parts of the leaves and some hairs on the style. In other respects the specimens in each instance are well matched.

Bentham gives the Darling Range as the habitat and Collie as the collector of the original material, and the type is the only specimen of the species in the Kew Herbarium. The Darling Range is in the south-western portion of Western Australia. The sheet bearing the type specimen is inscribed " Armstrong, Port Essington," in Sir W. J. Hooker's handwriting. This inscription is crossed out and Bentham has written a note : " probably Darling Range, Collie (the loose scape was with the Darling Range [*P.*] *occidentalis*)."

Considering the close similarity of Basedow's specimens to the type and the correspondence in geographical distribution in each instance, it appears almost certain that the original inscription indicating Port Essington as the locality and Armstrong as the collector of *P. macrantha* is correct.

The explanation of Bentham's scepticism as to the locality is probably to be found in the fact that the other known species were confined to the south-western, southern and extreme eastern parts of the Continent. The definite record of a species in Arnhem Land is of considerable interest as this region is far distant from the known locations of the other Australian species.

Since the publication of Flora Australiensis three species of *Patersonia* have been found outside Australia. Two of these were described by Dr. Stapf from Borneo and one by Miss Gibbs from New Guinea. The Arnhem Land species is intermediate, in a geographical sense, between the large group of extra-tropical Australian species and the New Guinea and Bornean species. W. D. FRANCIS.

International Horticultural Congress, 1930.*—The ninth International Horticultural Congress was held by invitation of the Royal Horticultural Society in London from the 7th to 15th of August, 1930. The Report and Proceedings now issued contains the official account of the speeches and resolutions, a list of members, and the papers read. The latter are printed sometimes *in extenso*, sometimes as abstracts. The papers and discussions were divided into three groups ; those dealing with propagation, with pomology, and with tropical and subtropical horticulture. The Report is well produced and freely illustrated. It is impossible to refer in a short note to all

* Report and Proceedings of the IX International Horticultural Congress, 1930. Published by the Royal Horticultural Society, London, pp. 450. Price 15/-. It is understood that only a limited number of copies of the Report are available.

the papers presented. Many of them are of practical or specialist importance, but the following may be mentioned as of particular botanical interest : " Studies in Sterility," by Mr. M. B. Crane and Mr. W. J. C. Lawrence ; " Anatomical Structure of Woody Plants in relation to Vegetative Propagation," by Dr. H. A. A. van der Lek ; " Vegetative Propagation from the Standpoint of Plant Anatomy," by Prof. Priestley ; " Somatic Mutations in Potatoes," by Dr. R. N. Salaman ; " Graft Hybrids and the Induction of Polyploids in *Solanum*," by Dr. F. W. Sansome ; " The Interrelations between Vegetative Propagation and Seed Reproduction," by Dr. A. B. Stout ; " Ueber Xenien bei Leguminosen," by Prof. Tschermak-Seysenegg ; and " The Wild Progenitors of Fruit Trees in Turkestan and in the Caucasus," by Dr. N. I. Vavilov. W. B. T.

Trees of Northern Bengal.*—Dr. and Mrs. Cowan have accomplished a very useful work in bringing up to date the " List of Trees, etc., found in the Darjeeling District," first issued by the late Mr. J. S. Gamble in 1878, with a second edition in 1895. The original list was confined to the Darjeeling and Jalpaiguri Forest Divisions ; the present volume comprises the Kurseong, Kalimpong, and Buxa Forest Divisions as well. With the lapse of time, bringing additional investigation, a considerable number of species has been added to the known flora of the tract. Mr. Gamble's second edition listed 950 species of flowering plants and 12 ferns, the volume under consideration lists 1310 phanerogams and 15 ferns.

The plan of the original work has been adhered to, but further information and an enlarged vernacular nomenclature have been added. The collections and notes made by the authors in the field, when Dr. Cowan was serving as a Forest Officer in the locality, have been drawn upon, but much of the taxonomic work was done at the Kew Herbarium and a graceful acknowledgment is made of the assistance given in person by Mr. Gamble. C. E. C. F.

Icones Filicum Sinicarum.†—This volume, which is a Chinese production throughout, is the first of a series which will in time include illustrations and descriptions of every fern found in China. The species illustrated in the first part are fifty in number and are taken at random from twenty-seven genera. The illustrations, which are line drawings, are definitely in the first class, though one could wish that the block makers had taken a little more care in their preparation. The artist responsible, whose name is omitted, has

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*" The trees of Northern Bengal, including shrubs, woody climbers, bamboos, palms and tree ferns," by A. M. Cowan and J. M. Cowan. Published by the Bengal Secretariat Book Depot, Calcutta, 1929, pp. 178. Price R. 1-12 or 3*s*.

†Icones Filicum Sinicarum. Fasc. 1, by Hsen Hsu Hu, and Ren Chang Ching. The Metropolitan Museum of Natural History, Academia Sinica, Nanking, and the Fan Memorial Institute of Biology, Peiping, 1930, pp. vi +102, 50 plates.

produced drawings which would be hard to excel. As the book is a quarto the plants are illustrated natural size, whilst there are many excellent details drawn to a larger scale.

The text, for which Mr. Ching is largely responsible, is in English and Chinese, and we understand that every drawing has been prepared from the type or the type number of the respective species.

The most interesting fern illustrated is probably *Cheiropleuria bicuspis* (Bl.) Presl, which appears on Plate 50. This genus had been quite unknown in China prior to its discovery in 1928 by Mr. Ching, who found it in N. Kwangsi on a limestone cliff.

The volume is so bound that on the completion of the series it will be a simple matter to break up the parts and reassemble the species under genera. F. B.

Flora of West Tropical Africa.*—The first part of volume ii of this Flora was published in March, 1931. It consists of 292 pages and text-figures 178-277, and deals with all the West African *Gamopetalae*, beginning with *Ericaceae* and ending with *Labiatae*. The family *Rubiaceae* is represented by 73 genera and over 400 species and occupies nearly a quarter of the part. *Compositae* has 72 genera but is represented by a much smaller number of species than *Rubiaceae*. Most of the remainder of the families were elaborated in the later volumes of the general Flora of Tropical Africa, and these do not show much increase in the number of species, the few novelties being mainly from the collections of Dr. A. Chevalier in French West Africa, and of Dr. J. Mildbraed in the British Cameroons. In addition to Mr. Trevithick's drawings, others have been prepared for this part by Miss Ross-Craig, and as usual they have been very well reproduced. Volume ii, part ii, now in preparation, will deal with the *Monocotyledons* and will complete the Flora.

Kew Bulletin, General Index.—A general Index to the *Kew Bulletin* for the years 1919-1928 has been published, price 2s. The work forms Appendix IV to the *Bulletin* for 1930, but it is separately paged and will not be bound up with the volume. The new publication and *K.B.* Additional Series XI form a complete Index covering the *Bulletin* from its commencement in 1887 up to the end of 1928.

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*Flora of West Tropical Africa.—By J. Hutchinson and J. M. Dalziel. To be completed in four parts. Vol. i, parts 1 and 2; vol. ii, part 1; 8*s.* 6*d.* each part. The Crown Agents for the Colonies, 4, Millbank, London, S.W.1.

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